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Space Log

Volume 22

TRW Space Log is published by the Space & Technology Group of TRW's Electronics and Defense Sector. Information is drawn from data released by the National Aeronautics and Space Administration, Department of Defense, Library of Congress, United Nations, British Royal Aircraft Establishment, TASS, Teledyne Brown Engineering's "The Soviet Year in Space 1986," and other official sources. Where facts and other data appear in conflict, NASA records are cited. While diligent efforts are made to ensure accuracy, comments and corrections of fact are invited. TRW Space Log is unofficial and not published under government contract. Professional personnel in the aerospace industry, the military and other government agencies may request Space Log by writing (on company or organization letterhead): Editor, TRW Space Log, TRW Space & Technology Group, One Space Park, Mail Station 135/1477, Redondo Beach, CA 90278. Please include your internal mail location.

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Introduction

When historians in 2086 look back on 1986, they will probably say that that far distant year was the turning point of America's space program. It was the year of the Challenger disaster, a year of a series of unmanned booster failures and a year of soul searching by all elements of the nation's space program.

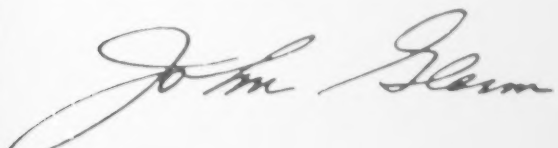
But, it was also the year of rededication of NASA and the aerospace industry to ever higher levels of quality and performance. It was the year that the National Commission on Space released an exciting 50-year proposal for manned and unmanned space ventures, including landings on Mars. It was the year that NASA defined its next step in the frontier of space, the permanently orbiting Space Station.

This edition of Space Log reports on the events in space in 1986. While the Challenger tragedy weighs heavily upon us, there were still a significant number of triumphs. Many were in the area of scientific research. Most were by foreign countries growing steadily as participants in the space age. Meanwhile, the United States recorded its lowest number of launches to orbit since 1957.

It is often said that hope rises from the ashes of disaster. Let us hope that from the Challenger disaster in 1986 will rise a more finely honed, clearly defined space program for the United States. As the National Commission on Space said in its report in May of this fateful year:

"With America's pioneer heritage, technological preeminence, and economic strength, it is fitting that we should lead the people of this planet into space. Our leadership role should challenge the vision, talents, and energies of young and old alike, and inspire other nations to contribute their best talents to expand humanity's future."

It is from that perspective that historians will judge 1986.



John Glenn
United States Senator

Spacecraft Details 1986

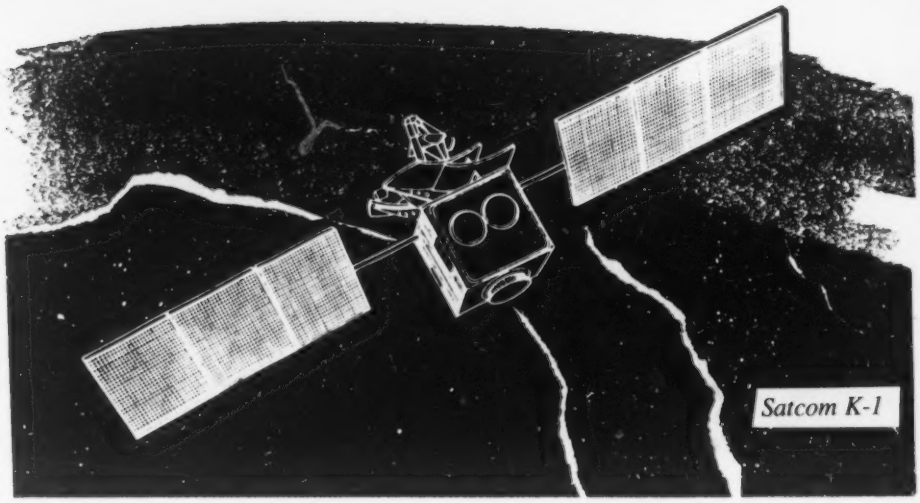
Includes most major commercial launches; military payloads not included. Spacecraft/launch data are listed chronologically. All times listed are Universal (Zulu, GMT) unless otherwise indicated. For additional details, refer to 1986 Summary Log of Space Launches.

STS 61-C

The STS flagship Columbia lifted off on its seventh mission from Cape Canaveral at 11:55, January 12. The 37.2-m long, 23.3-m tall orbiter had undergone extensive overhauling since its last mission in December 1983. Essentially a test ship, Columbia was updated with a navigation system and advanced equipment equivalent to its counterparts. Its body and 23.7-m wingspan were strengthened. New sensors in the orbiter's nose and tail provided hypersonic flight data; an infrared camera mapped ship surface temperatures as it reentered the atmosphere. The veteran shuttle followed a more stressful than usual ascent profile to gain a more accurate reading of actual wing loads. The 24th shuttle mission crew included Robert Gibson (commander), Charles Bolden (pilot), George Nelson, Steven Hawley, Franklin Chang-Diaz (mission specialists), Robert Cenker (payload specialist) and Representative Bill Nelson (D-Fl). Nine and a half hours after liftoff, the crew deployed the RCA Satcom K-1 satellite. Columbia hosted a new "Hitchhiker" payload carrier, and a dozen experiments. The crew photographed Comet Halley, observed specific earth locations using an infrared camera and studied the effects of weightlessness on blood, seed, shrimp, ticks and moths. Waved off from KSC, Columbia touched down on Edwards AFB runway 22 at 13:59, January 18, after 6 days, 2 hrs, 4 mns.

Satcom K-1

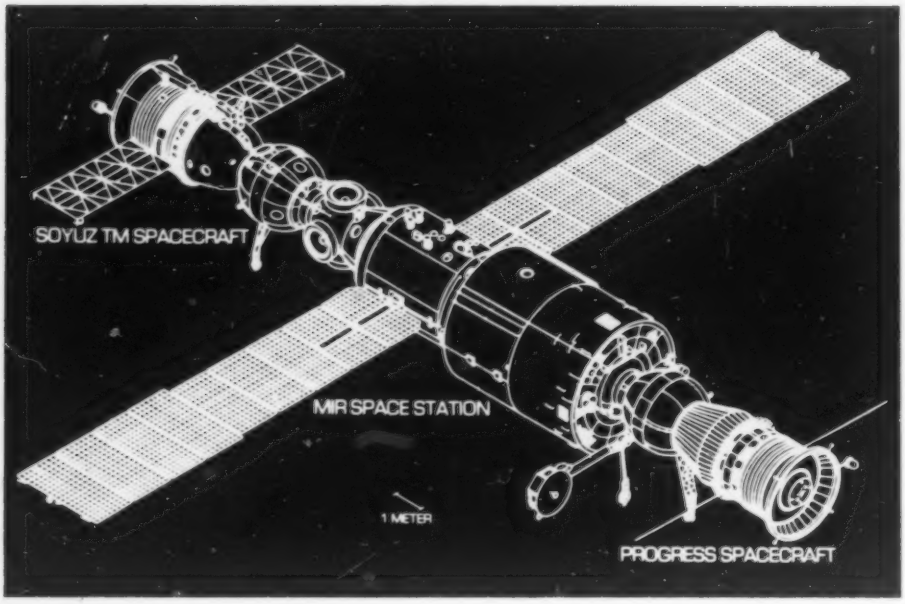
The second in a series of RCA K-band communications satellites providing voice, TV, data and facsimile service to commercial users in the 48 contiguous states, Satcom K-1 was shuttle launched at 21:17, January 12. Forty-five minutes after deployment, the Pam-D2 engines fired, sending Satcom K-1 into an elliptical transfer orbit. On January 15, its apogee kick motor thrust



the vehicle into geosynchronous orbit above 85 deg. w long. Satcom K-1 joins Satcom K-2, part of the RCA Americom Domestic Satellite System, to serve satellite master antenna television (SMATV) and distribute TV programming to small-diameter antennas. Because K-band signals do not interfere with terrestrial microwaves as C-band signals do, more powerful K-band transmissions can be sent to metropolitan areas; small, one-meter dishes can receive them. Satcom K-1, operating at 14/12 GHz, carrys 16 45-watt operational transponders and six spares. The three-axis-stabilized satellite weighed 1,923 kg at launch and measures 1.7 x 2.4 (with antenna horn) x 1.5 m. Transponders and housekeeping subsystems are mounted on opposite sides of the spacecraft; additional components are mounted on a base panel. Solar arrays span 20 m tip to tip and provide 2,800 watts of power.

BS-2B (Yuri)

The Japanese direct broadcast communications satellite, BS-2B, slated to replace the malfunctioning BS-2A, lifted off from Tanegashima Space Center at 07:55, February 12 aboard an N-II launch vehicle. Also known as Yuri, the Japanese word for "lily," the three-axis-stabilized spacecraft weighed 677 kg at launch, and measures 1.20 x 1.32 x 2.89 m. Solar arrays span 8.95 m tip to tip. The satellite, operating at 14/12 GHz, will relay color TV signals to 400,000 viewers in outlying areas of Japan. Traveling wave tube malfunctions on BS-2A caused the Nihon Hoso Kyokai (NHK) National Broadcasting Corporation to downgrade it from operational to experimental. BS-2B, stationed above 110 deg. e long., was expected to attain full operational status. NHK delayed accepting the satellite when attitude control problems allowed BS-2B to deviate 20 degrees by early June. Attitude corrections were made by redundant systems and the satellite was accepted in July. Service was scheduled to commence in December.



Mir Space Station
(Drawing by Daniel Gauthier)

Mir

The base module of the Soviet permanent space station was launched from Tyuratam at 21:29, February 19, by a Proton launch vehicle. The 13.13-m-long Mir weighs 21 metric tons and has six docking ports, two for Soyuz-type vehicles, four for others. Mir is cylindrical; maximum width is 4.2 m. Two 29.7-m solar panels extend from its center. Mir will serve mainly as living quarters for up to six cosmonauts. It contains separate cabin areas, a small dining area and dedicated space for science experiments.The new space station has increased communications capability, transmitting via the Soviet SDRN system, similar to the U.S. Tracking and Data Relay Satellite System. One of three geostationary communications satellites (Kosmos 1700) was in orbit during Mir's 1986 activities, increasing coverage from 15 minutes per orbit to 40. Cosmonauts Leonid Kizim and Vladimir Solovyov left earth aboard Soyuz T-15, March 13, and rendezvoused with Mir, March 15. Fifty meters from the station, Kizim took over manual operation, docking at 13:39. The first supply ship, Progress 25, arrived March 21, and docked automatically with the Mir/Soyuz T-15 complex. Before undocking on April 20, Progress 25's propulsion system was used to boost the space station 10 km. Progress 26 docked April 27, remaining until June 22. After 50 days aboard Mir, Kizim and Solovyov flew Soyuz T-15 to the Salyut 7/Kosmos 1686 complex orbiting some 4,000 km away. The first station-to-station transfer was successfully executed May 6. Mir, left in autonomous mode, was joined

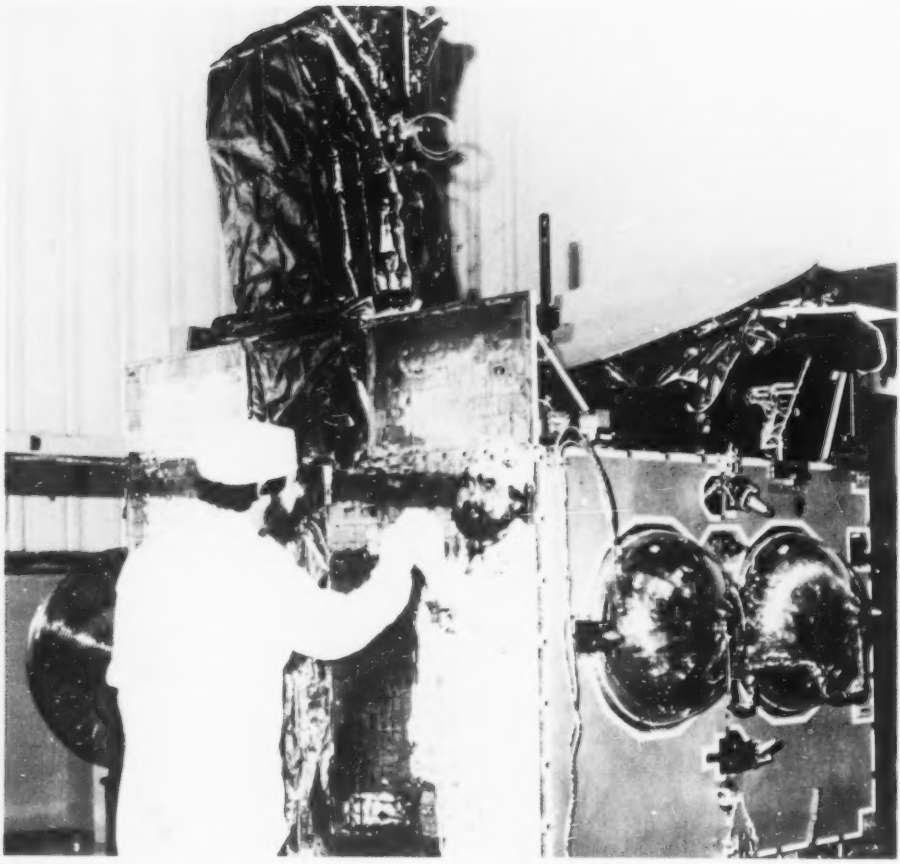
by a new generation transport, Soyuz TM, May 23. The new vehicle, designed to carry crews, spent six days at Mir testing a new rendezvous and docking system. During their 50 days at Salyut 7, Kizim and Solovyov performed two EVA's (3 hrs, 50 mns on May 28; 5 hrs on May 31), assembling a 15-m structure and attaching it to the station. The cosmonauts left Salyut 7 aboard Soyuz T-15, June 25, redocking with Mir on June 26. After 125 days in space, the crew reboarded Soyuz T-15, undocked with Mir at 9:07 and landed in the USSR at 12:34, July 16.

SPOT-1

The French earth resources satellite, designed to provide high resolution images for government and commercial users, was tandem launched aboard an Ariane 1 launch vehicle at 01:45, February 22, from Kourou, French Guiana. The first Ariane polar launch and the last of the Ariane 1 series placed SPOT-1 in a sun-synchronous orbit phased with earth; it scans the entire globe and returns to the same position respective to earth every 26 days. The spacecraft measures 2 x 2 x 3.5 m and weighed 1,830 kg at launch. Solar arrays span 15.60 m and supply one kW of power. Sponsored by CNES, the French National Space Research Agency, SPOT-1 carries two HRV (High Resolution Visible) imaging instruments, two image data recorders, and a telemetry package for image transmission. The HRVs record images in the visible and near infrared spectral bands; 60 x 60-km land scenes have 10 m (black and white) to 20 m (multispectral) resolution. A movable mirror system gives the HRVs oblique viewing; a specified scene can be viewed more frequently or from different angles. SPOT-1 images provide earth resources information applied to geology, agriculture, forestry, hydrography, oceanography, cartography and urban development. The satellite began returning images 48 hours after launch, some 18,000 were obtained during its first 60 days in orbit. The system will remain operational through the 1990s with the launches of SPOT 2,3 and 4.

Viking

Sweden's first satellite was tandem launched with SPOT 1 aboard an Ariane 1 at 01:45, February 22, from Kourou, French Guiana. Inserted into polar orbit, Viking's perigee kick motor fired after Ariane separation, boosting it into its planned 790 x 13,359-km elliptical orbit. The octagonal spacecraft measures 1.8 x 0.5 m and weighed 538 kg at launch. Eight body mounted solar panels provide 80 watts of power. Four 40-m wire booms, two 4-m wire booms and two rigid axial booms extend from the spacecraft. Electric field sensors are mounted at the end of the wire booms; a magnetometer rests at the end of one axial boom. The satellite is spin stabilized at three rpm. Viking is performing advanced magnetospheric and auroral research.



GSTAR 2

Five groups of experiments measure electromagnetic and geomagnetic vector fields, cold plasma density, hot plasma distribution, hot ion composition, electrical and magnetic waves and plasma density waves. Two CCD cameras record ultraviolet images of the auroral zones for comparison with data returned by the other instruments.

GSTAR 2

The fourth in a series of GTE Spacenet communications satellites, GSTAR 2 provides voice, video and data service for commercial users in the U.S. Tandem launched with Brasilsat 2 at 23:30, March 28, by an Ariane 3, from Kourou, French Guiana, GSTAR 2 joins GSTAR 1 and Spacenet I and II in geosynchronous orbit. The 1,243-kg, three-axis-stabilized satellite is box-shaped, measuring 1.6 x 1.3 x 1 m. Solar arrays extend 12 m when fully deployed. Electrical subsystems, batteries,propulsion and stationkeeping equipment are mounted on six honeycomb panels which make up the

spacecraft structure. Two communications antenna reflectors, a command/telemetry antenna and earth sensors are mounted on the earth-facing panels. Ku-band service is offered over 16 channels operating at 14/12 GHz. The 48 contiguous states are covered by a shaped beam; Alaska and Hawaii are reached via spot beam. The three-stage 39.9-m Ariane 3 is a modified version of the Ariane 1, offering heavier lift (2,600 kg) capability. GSTAR was inserted into geostationary transfer orbit within 6 km of apogee target. Following spin up and separation, its apogee kick motor fired, boosting it to an 35,775 x 35,800-km orbit above 105 deg. w long.

Brasilsat 2

Completing the spaceborne segment of the Brazilian System of Communications Satellites (BSST), Brasilsat 2 was launched with GSTAR 2 at 23:30, March 28, aboard Ariane 3, from the new ELA-2 launch site at Kourou. Brasilsat 2 joins Brasilsat I, providing TV, telephone, telex and data transmission throughout Brazil for Embratel, the state organization which operates the national telecommunications service. The cylindrical, 1,140-kg vehicle is 2.16 m in diameter and 2.95 m at launch, extending to 7.05 m in orbit with de-spun antenna array deployed. The spin-stabilized satellite is covered with solar cells providing 982 watts of power. Twenty-four channels operating at 6/4 GHz can handle 12,000 phone calls or 24 TV programs simultaneously. Brasilsat 2 separated from the Ariane third stage 20 minutes after liftoff, two minutes behind GSTAR 2. Its apogee kick motor propelled it on to a geosynchronous station above 70 deg. w long.

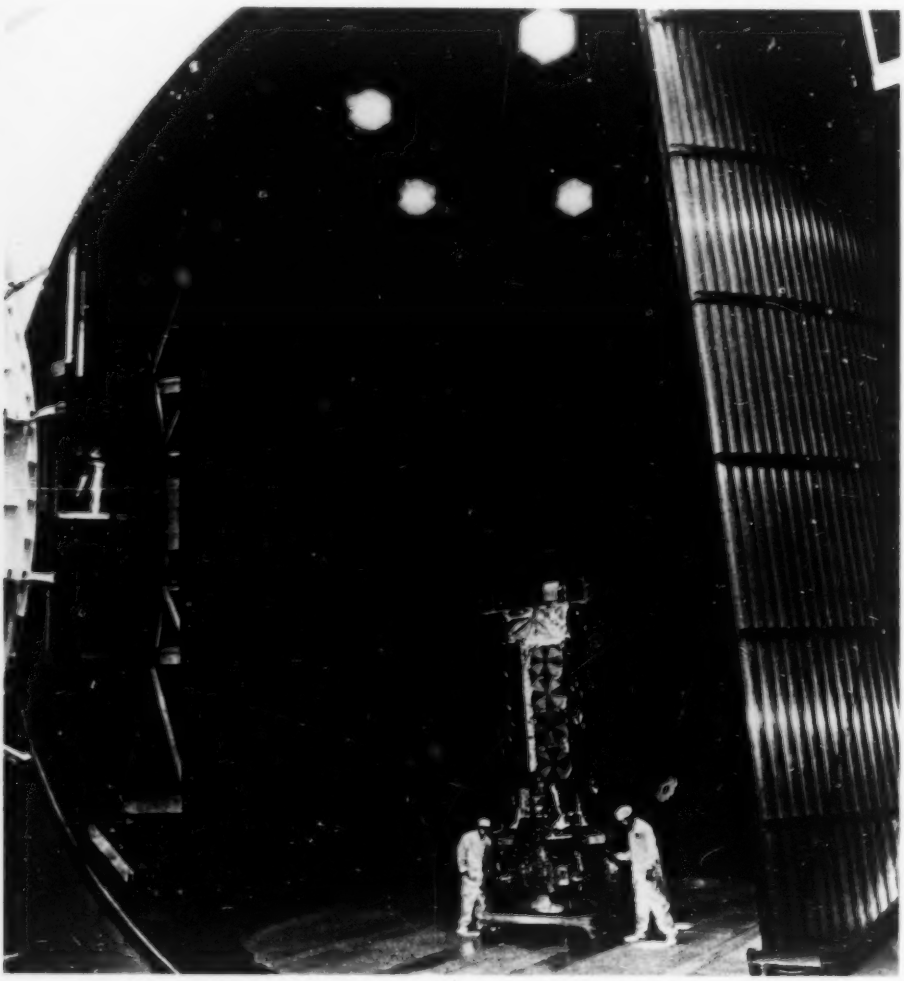
EGP

One of two spacecraft tandem launched to test Japan's new H-1 launch vehicle, the Experimental Geodetic Payload flew into orbit 08:45, August 12, from Tanegashima Space Center. The 42-m-tall H-1 uses the same first stage as the N-II — a Delta 2914 built under Mcdonnell Douglas license by Mitsubishi. The second stage is a powerful new LE-5 liquid hydrogen/oxygen booster developed by Mitsubishi for Japan's National Space Development Agency. The LE-5 delivers 10 tons thrust and is designed to lift 590-kg payloads into geosynchronous orbit. Its first flight goal was not geosynchronous orbit, however. The 685-kg Experimental Geodetic Payload was successfully lifted to a 1,479 x 1,497-km orbit. The 2.15 m globe, covered with mirrors that reflect both sunlight and lasers, serves as a passive target for ground based laser beams. Purpose of the mission is to improve triangulation measurements.

JAS-1

Tandem launched with EGP aboard the H-1's maiden voyage, the Japanese Amateur Radio Satellite lifted off at 08:45, August 12, from Tanegashima Space Center. The 50-kg, 0.5-m polyhedron is covered with solar cells, and allows amateur radio operators to transmit messages around the world. Received messages are stored aboard JAS-1 until retrieved by users as the satellite passes above them during its 1,479 x 1,497-km orbit. The satellite has a three-year life expectancy. The H-1 test launch employed a two-stage version of the vehicle. A scheduled 1987 launch will carry its full three stages.

NOAA-10

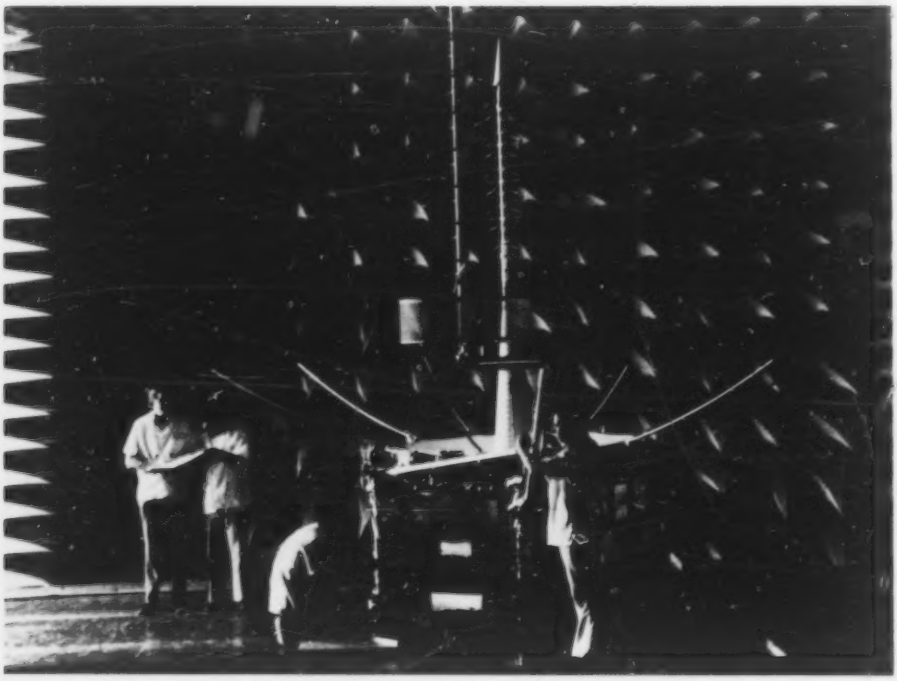


NOAA-10

A fourth-generation (Advanced Tiros-N) weather satellite built for the National Oceanic and Atmospheric Administration, lifted off from Vandenberg AFB aboard a modified Atlas E at 15:52, September 17. NOAA-10 replaces the aging NOAA-6 to join global weather watcher NOAA-9 in a north-south polar orbit. The satellite stands 4.9 m high, is 1.9 m in diameter, and weighed 1,712 kg at launch. A solar array of eight 61 x 237 cm panels extends from one end of the spacecraft body. Canted 36 degrees to normal orbit, the array rotates once per orbit to continously face the sun. It provides 1,470 watts of power. Onboard sensors measure earth's cloud cover, surface temperature, atmospheric temperature, moisture and electric particle flux. A data system collects environmental information from sensors on land, at sea and in the air. Medium to high resolution pictures are transmitted via VHF and S-band to ground stations in real time. A Solar Backscatter Ultraviolet instrument measures earth's ozone distribution; an Earth Radiation Budget Experiment determines the earth's radiation gains and losses. NOAA-10, like NOAA-9, is equipped with an L-band search and rescue payload that pinpoints distress signals from ships and aircraft. A joint French/Canadian/U.S./USSR program, the SARSAT network has saved some 550 lives since its 1979 inception. NOAA-10, on its first day of operation, September 23, directed a rescue team to a downed aircraft in Canada. Four lives were saved.

Polar BEAR

The Polar Beacon Experiments and Auroral Research satellite, sidelined for eight years in the National Air and Space Museum, was launched into polar orbit from Vandenberg AFB at 12:23, November 14. One of the Navy's early 1970s Transit series, the satellite was donated to the museum in 1976 when its planned mission to replace a long-lived Transit navigation satellite was deemed unnecessary. Recalled in 1984 for an Air Force research program, the museum piece was refitted with three experiments and additional electronics packages. In excellent condition, the satellite's bus, solar panels and original electronics were retained. The 125-kg Polar BEAR was boosted by a 23-m-tall solid-fuel Scout. The launcher's four stages deliver 195,500 lbs thrust. Polar BEAR is photographing the northern lights and sampling electrical particles and the earth's magnetic field over polar regions. These phenomena interrupt communications with polar orbiting satellites. Data gathered by Polar BEAR will help the Air Force predict interference and improve communications between ground stations and polar orbiting satellites.

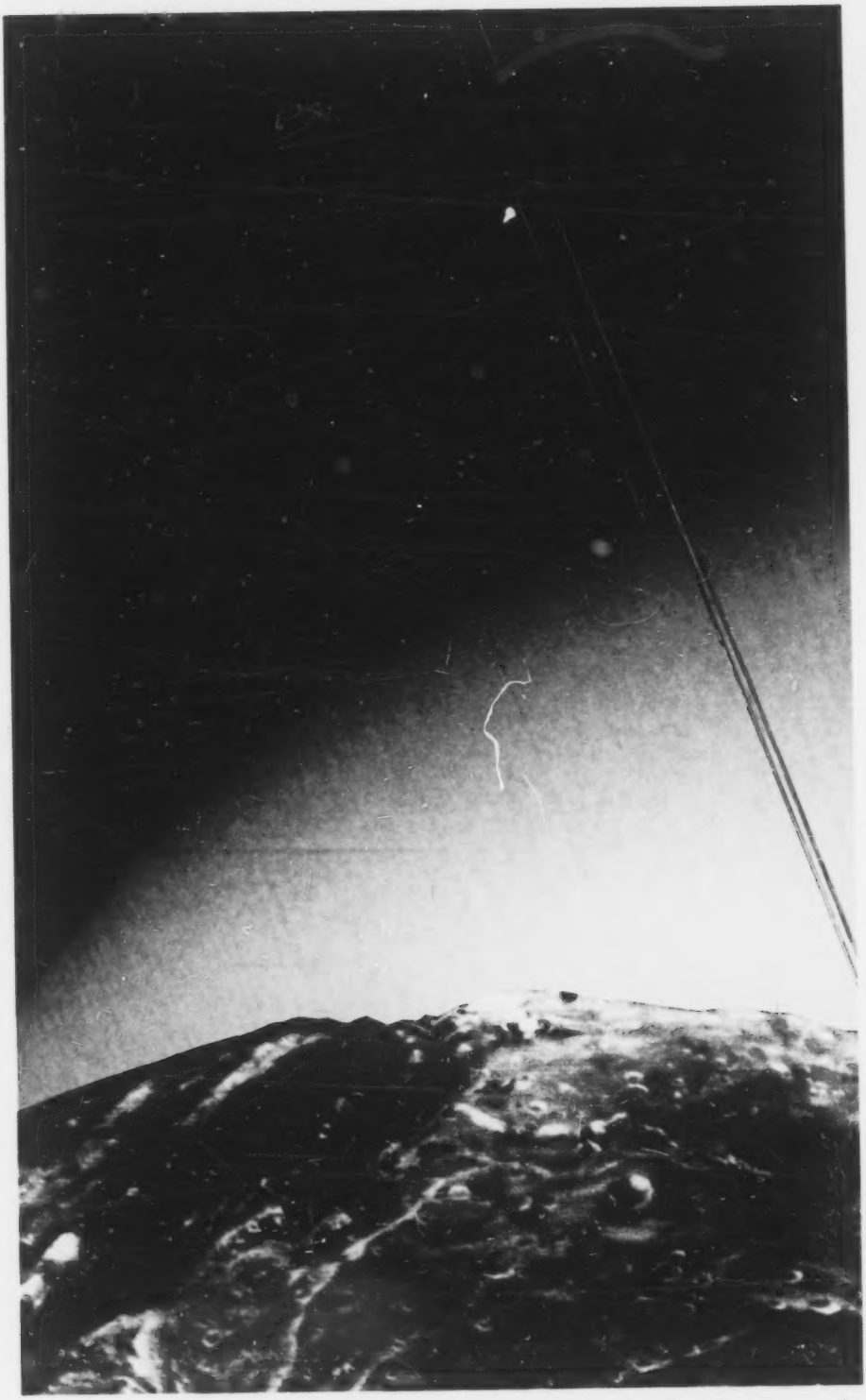


FltSatCom

FltSatCom

The Navy's Fleet Satellite Communications System provides global communications for naval aircraft, ships, submarines, ground stations, the Strategic Air Command and the Presidential Command network. The original series, launched between 1978 and 1981 provides 24-hour global coverage; system capability is being expanded with three more spacecraft in geosynchronous orbit. Flight 7, carrying an experimental EHF package, was launched from Cape Canaveral aboard an Atlas Centaur, at 02:31, December 5 (9:31 December 4, E.S.T.) The 2,310-kg satellite consists of three 2.49-m-hexagonal modules, 1.67 m tall, with one 18-turn helical UHF receive antenna, and one 4.88-m parabolic UHF transmit antenna. The communications subsystem provides 23 channels for aircraft, ships and mobile ground users. Two 2.18 by 4.13-m solar arrays provide 2,192 watts of power (beginning of life). FltSatCom is three-axis stabilized with redundant body mounted momentum wheels. When the F-6 launch slipped to the point where F-7 was ready, the Navy decided to launch the spacecraft containing the experimental EHF package first. Flight 7 was placed in geostationary parking orbit at 100 deg. e long. Flights 6 and 8 will follow in 1987.

Flight 6, launched March 26, 1987, was destroyed by range safety when the launch vehicle flew out of control.



A montage of Voyager 2 images showing Uranus superimposed with a close-approach image of Miranda. (Photo courtesy of JPL)

Voyager 2 at Uranus: An Overview

After an eight and a half year, three billion mile odyssey in space, Voyager 2 rendezvoused with Uranus, January 24, 1986. The spacecraft's closest approach — 107,000 km from the planet — occurred at 9:58:51 PST, one minute ahead of schedule. Because Uranus is tilted on its axis, with rings and moons perpendicular to the ecliptic rather than parallel as with every other planet in the solar system, Voyager 2 flew in and out of the Uranian system in a matter of hours. Most of the priority science took place in the four hours before and two hours after Voyager's closest approach, although observations began November 4, 1985, and ended February 25, 1986.

Early on, some 31 million km from the planet, Voyager's instruments detected a new 160 by 160-km moon between Miranda's orbit and the edge of the Uranian ring system. Before encounter's end, the spacecraft had discovered 10 new moons, including two "shepherds," orbiting on either side of the Epsilon ring.

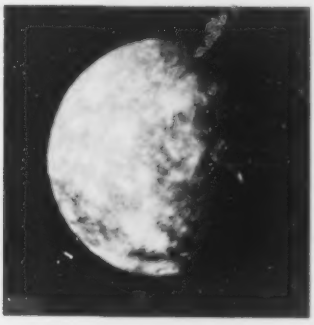
The planet's known ring inventory also grew. Voyager found a tenth, previously unseen, thin ring just inside the Epsilon ring and a wide band of material starting close to Uranus and extending some 3,000 km. Several ring fragments were also identified. The rings themselves are unlike any seen before. Instead of fine particles and dust, Uranus's rings are composed of large chunks of coal-like material, ranging from one to 1,000 m across.

The third largest planet was full of such surprises. Dominated by an unusual magnetic field skewed 55 degrees from the planet's rotation axis, Uranus wobbles back and forth. This wobbling causes the magnetosphere to flow behind the planet in a corkscrew fashion, instead of trailing straight like the magnetic tails of Earth, Saturn or Jupiter. As the planet rotates about its axis, the "tilted" magnetic field axis sweeps around in a cone formation. This phenomenon made it difficult for scientists to measure radio emissions used to determine the length of the Uranian day — 17 hours. Uranus's rotation axis, too, is tilted — some 90 degrees. Scientists speculate that a collision with an earth-sized object is responsible. The tilt places one pole towards the sun and one pole in darkness for 42 of the planet's 84-year orbit around the sun. Voyager scientists expected the south pole (sun facing) to be warmer than the north pole. Not so. Temperatures are virtually identical (-360 degrees F in the upper atmosphere), with the north pole a few degrees warmer. Voyager detected four white wisps, believed to be methane clouds, speeding around the planet. Observed climatic conditions indicated that the clouds should move to the east, they were, in fact, moving west, the same direction Uranus rotates.

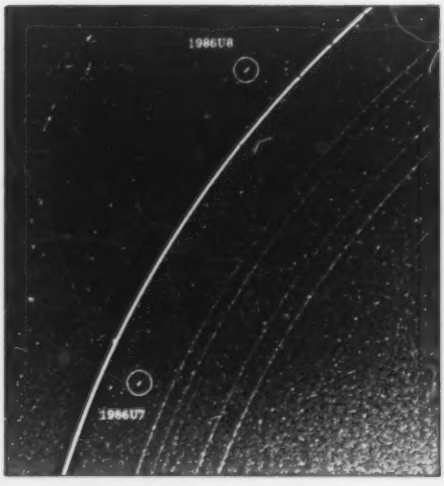
Expected atmospheric striping caused by currents flowing from a warm pole to a cold pole were absent. Instead, scientists found belts of aquamarine methane circling parallel to the equator. This, coupled with the "back-

Uranus ring system from a distance of 236,000 kilometers showing bright dust lanes not previously seen.

Oberon



Titania



Two newly discovered moons, designated 1986U7 and 1986U8, on either side of the bright epsilon ring.

The nine known rings of Uranus with the 10th ring barely visible between epsilon and the next ring.

wards'' wind direction, indicates that surface conditions are affected by heat from the planet itself and not the sun. Investigators have surmised that Uranus is covered with a scalding 8,000-km-deep ocean of water and ammonia, heated by the planet's core. Churning activity within the ocean may be responsible for Uranus' bizarre magnetic field.

The sun, however, does exert influence. A layer of smog seen high above the south pole may be formed of polymers created as carbon-based molecules react with sunlight. The sun may also power the ''electroglow,'' an aurora-like layer of bright ultraviolet light observed in the planet's sunlit atmosphere. Voyager 2 witnessed another ultraviolet emission on the planet's dark side — visual evidence that Uranus contains internal heat. Instruments verified that Uranus emits more ultraviolet light than it receives from the Sun.

The 50,000-km-diameter gas giant's atmosphere is mainly hydrogen, some 12 percent helium and a smattering of methane. It hosts almost no water or ammonia. The planet is surrounded by a large plasma belt — a gas of electrically charged particles trapped by the magnetic field — similar to the Van Allen radiation belts.

While Uranus is largely featureless, its moons, the darkest objects in the solar system, display cataclysmic geologic events. The 1,630-km-diameter Oberon is cratered and must have once been flooded with a dark fluid, now hardened. Ariel, 1,330-km across, is rent with deep, jagged canyons and possible glacier tracks. Lacy frostlike patterns on 1,600-km Titania indicate that material erupted from its core, froze and then settled on the surface. An otherwise dark Umbriel, 1,110-km in diameter, is marked with a bright, circular feature resembling a doughnut.

Miranda, the 500-km innermost moon, is unlike any body yet seen in the solar system, landscaped with deep canyons, parallel ridges, sharp cliffs, valleys and craters. Because the craters' insides are older than the outsides, scientists believe Miranda may have restructured its own interior at one point. An enormous chevron pattern dominates the moon's troubled terrain, leaving investigators bewildered and Miranda shrouded in mystery.

Capturing these spectacular lunar images, and those of Uranus and its rings, was a major mission challenge. Uranus receives only one-four hundredth as much light as earth, meaning imaging exposures had to be long. Any spacecraft movement — and it flinched every time the tape recorders started — would blur the images. Spacecraft thrusters had previously been programmed to offset slight jerks in the yaw axis; for this mission they were instructed to correct for the pitch axis, too. Since Voyager 2 was speeding by its target at 14 km per second, Uranus, its rings and moons would quickly shift within the camera's field of view. Spacecraft controllers were reluctant to slew the camera platform enough to compensate, it might have damaged the gearing. Therefore, a special technique was developed wherein the entire spacecraft rotated while the camera shutter was open. The necessary long shots were successfully obtained, including a 96-second exposure highlighting the Uranian rings.

In addition to its two-camera imaging system, Voyager 2 carries 10 scientific instruments. All were operational at the time of the Uranus encounter. The Infrared Interferometer Spectrometer and Radiometer gathered temperature data; the Ultraviolet Spectrometer studied atmospheric composition. The Photopolarimeter subsystem studied particles in the atmosphere and rings; the Cosmic Ray Subsystem measured energetic particles; and the Low-Energy Charged-Particle Detector characterized their composition and energies.

The Magnetic Fields experiment verified the existence and character of the magnetosphere; the Planetary Radio Astronomy Experiment searched for and studied radio signals; the Plasma Subsystem looked at hot ionized gases within Uranus' magnetosphere. The Plasma Wave Experiment measured the electric field components of plasma waves and sent back the sounds of electric field waveforms. The Radio Science Subsystem conducted investigations at Uranus and served as Voyager 2's two-way communications link with earth. Three sets of twin computers positioned the craft and controlled its communications and experiments.

Image and data transmissions took two hours, 45 minutes to reach earth, 2.94 billion km from Uranus. The weak Voyager signal was aided by new 34-m dish antennas installed at Deep Space Network (DSN) ground stations in Australia, Spain and California. Ground station electronics were upgraded and one million lines of computer code replaced. Several 64-m antennas (particularly those at Canberra and Parkes Radio Observatory, Australia) were electronically linked into a single ultrasensitive receiver. When paired with the new 34-m antenna at the Australian DSN station, received Voyager data tripled.

Voyager 2 was launched August 20, 1977 by a Titan Centaur on a trajectory to Jupiter and Saturn. Its twin, Voyager 1, was launched September 5, 1977 on a like mission. Voyager 1 completed its planetary encounters (Jupiter, March 1979; Saturn, November 1980) and is traveling toward interstellar space on a path away from the ecliptic plane. Voyager 2 flew by Jupiter in July 1979, and Saturn in August 1981. A unique planetary alignment occurring once every 175 years enabled the spacecraft to use the gravitational field of one planet to slingshot it on to the next. Voyager 2's final planetary encounter is with Neptune in August 1989.

Both Voyager spacecraft are expected to cross the heliopause, the unknown boundary separating the solar system from interstellar space, in the late 1990s. Voyager 1 is heading toward Alpha Ophiuchus; Voyager 2 to Alpha Canis Majoris.

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Compiled by L.R. Magnolia

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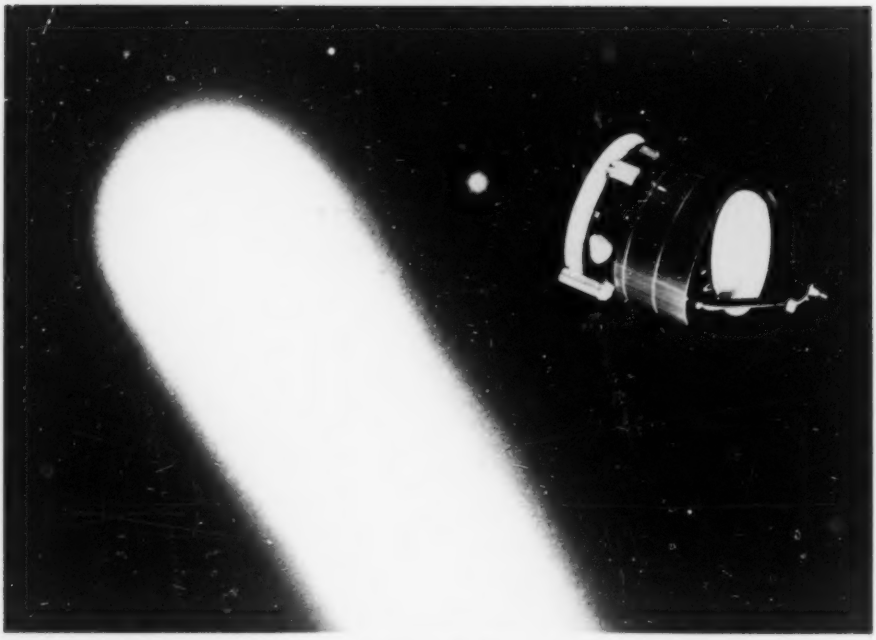


The Giotto spacecraft approaching Comet Halley. The painting is based on a May 8, 1910 photograph taken at Mt. Wilson Observatory. (Courtesy of European Space Agency)

Comet Halley's 30th known swing by earth may have disappointed earthbound viewers anticipating an encore of its 1910 appearance; but, faintness notwithstanding, it dazzled the science community. For the first time in its history of 76-year-long journeys around the sun, Comet Halley was met by an armada of international spacecraft and viewed from earth by the most extensive network of professional and amateur astronomers ever organized.

Ground-based observations were orchestrated by the International Halley Watch (IHW), recognized by the International Astronomical Union in 1982. The IHW recommended standardized observing techniques and set up an archive system for collected data. The organized effort ensured long-term, consistent monitoring at all wave lengths. Some 1,000 professional astronomers in 51 countries and 500 amateurs participated. Observations began pouring into IHW headquarters at the Jet Propulsion Lab in Pasadena, California, in the weeks preceding Halley's closest inbound approach to earth — 92.8 million km on November 27, 1985. Data will trickle in as long as earth observations are possible.

For eight days in March, as Comet Halley dove through the ecliptic plane, it was imaged, analyzed and explored by the Japanese Sakigake and Suisei, the

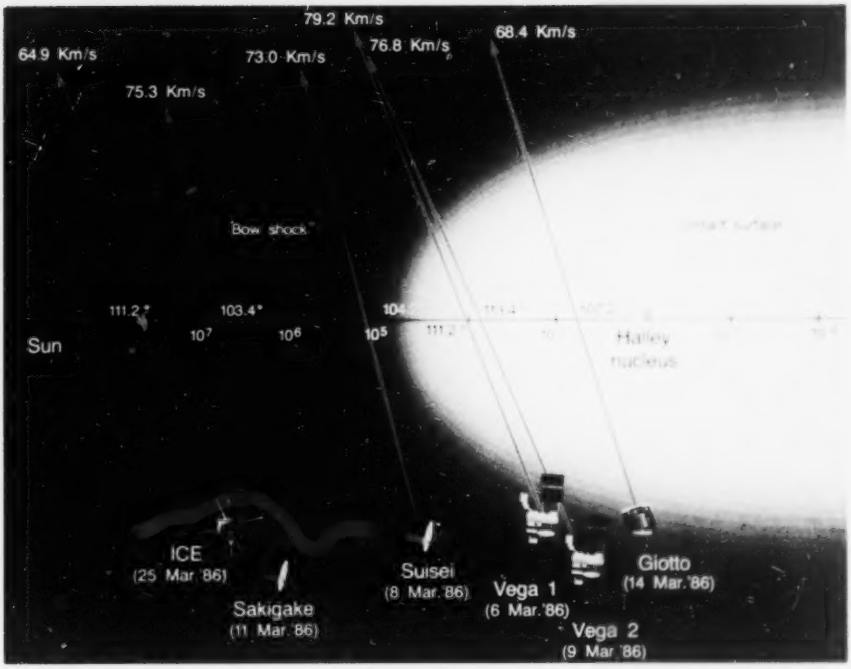
Soviet Vega 1 and 2 and the European Space Agency Giotto spacecraft. Several satellites, orbiting on other assignments, also monitored the Comet's passage.

Comet watch results were not surprising. Halley proved to be much like the "dirty snowball" modeled by Fred Whipple in 1950. Halley's nucleus is potato-shaped, 16 km long and 8 km wide. Generally smooth, it is marked by a small 400 to 500 m "mountain," and a shallow 1,600-m-diameter "crater." Its volume is estimated at 400 cubic m, plus or minus 30 percent. Mass is more difficult to measure; analysis indicates it may be anywhere from 50,000 million to 130,000 million tons. Its density range is 80 to 240 kg per cubic m. Rock, by comparison, is some 2,800 kg per cubic m; ice is 900.

Halley is among the darkest known objects in the solar system, with only a few percent of light reflected. It appears uniformly gray, a dusty snowball. Light striking its surface may be trapped by internal reflections within a sponge-like texture. Or Halley may be covered with a dark, tarlike substance. At the time of encounter about 8 percent of the surface was active, spewing off dust at a rate of 6 tons per second. Dust particles produced by the nucleus are of three types. The first contain carbon, oxygen, sodium, magnesium, silicon, calcium and iron. The second type are similar to the first, but hold more carbon, nitrogen and sulphur. The third group contain no rocky material, only the organic molecules carbon, hydrogen, oxygen and nitrogen. Investigators have named them CHON particles.

The isotope ratios of these elements are similar to those found on earth and in meteors. Since isotope ratios probably vary in different parts of our galaxy, these similarities support the hypothesis that comets are native to our solar system. The dust also proved that comets are primitive; its composition is too delicate to have undergone many changes since the universe was formed 4.6 billion years ago.

Although astronomers have long theorized that comets are composed largely of water ice mixed with methane, carbon dioxide and carbon monoxide, Halley is the first comet in which water was clearly seen. Gases in the coma are composed of 84 percent water, 3 percent formaldehyde and carbon dioxide and 1 to 2 percent carbon monoxide, carbon disulphide, methane and nitrogen.Comet Halley's period of rotation was not so neatly determined. Astronomers had concluded that Halley rotated every 2.2 days, a period supported by ground observations and measurements taken by Suisei, Vega and Giotto. However, a separate set of photoelectric observations made over 36 days showed a brightness cycle repeating every 7.4 days, evidence that the rotation period is longer than previously believed. It is possible that the nucleus is displaying both rotation periods. Theorists surmise that the rotation period is, in fact, 7.4 days, but that the comet is precessing, or wobbling about its axis, every 2.2 days. Or, just the opposite. The controversy remains unresolved. As Halley moves away from the sun and becomes less active, its rotation period may become more discernible. With that it mind, the IHW network will continue to monitor the comet through Winter 1988.



The encounter's geometries for the prime spacecraft missions to Comet Halley. (Courtesy of European Space Agency Publications Division)

On April 10, Comet Halley made its closest approach to earth — 62.4 million km. Low on the horizon and very faint, it was barely visible to the naked eye. The spacecraft had a better view.

The Soviet Vega 1, launched December 15, 1984, passed within 8,889 km of Halley's nucleus on March 6. The Comet's first visitor returned some 500 images in three hours, each one requiring nine minutes to reach earth from 174.4 million km in space. Vega 2, launched December 21, 1984, rendezvoused with Halley March 9. Passing just 8,030 km from the nucleus, Vega 2 transmitted some 700 images illustrating the dynamic properties, structure and composition of the comet. Both spacecraft were bombarded with dust particles as expected. Vega 1 was hit by a dust spike, but did not suffer as much damage as its sister ship, which encountered fewer but larger particles. Vega 1 sustained a 40 percent power loss; Vega 2, 80 percent. Seven instruments between the two craft were partially damaged, but no instrument was lost on both.

None of the Halley armada were equipped with guidance systems that would allow them to zero in on the Comet. They were flying toward an absolute point in space. It was agreed that the Vega spacecraft would serve as pathfinders for Giotto. The Deep Space Network tracked them as they sped by the Comet. This provided a series of pointing angles that enabled controllers to more accurately target the ESA spacecraft. Giotto passed within 40 km of the selected targeting distance.

Neither Japanese spacecraft needed retargeting; both were aiming at points far from the nucleus. Suisei, launched August 18, 1985, flew within 152,400 km of Halley's heart, March 8. It returned ultraviolet images of the 20-million-km-diameter hydrogen gas coma. Surprisingly, Suisei was hit by two dust particles over 1 mm in diameter. Scientists did not expect to find large particles that far from the nucleus. Sakigake, launched January 7, 1985, made its closest approach, 7 million km, March 10. Its solar wind ions instrument, magnetometer and plasma wave probe studied the effects of the solar wind on the Comet's tail.

The European Giotto, launched July 2, 1985, made the most hazardous crossing, streaking within 540 km of Halley's nucleus. Armed with a Whipple meteor shield to protect against dust impacts, the spacecraft was nonetheless temporarily knocked out of commission. Bombarded 100 times a second with particles weighing up to .001 gram, Giotto was, by encounter's end, coated with 26 kilograms of dust.

Giotto had returned some 2,000 images of Halley's dark and dusty heart when, 137.6 million km from earth and just two seconds from closest approach, telemetry stopped. A heavy concentration of dust knocked the high gain antenna out of alignment with earth. The nutation was corrected after 32 minutes and the data stream restored. Giotto suffered some thermal shroud, star mapper and solar cell damage, but is still healthy. The cometary veteran is now in an orbit that will bring it back by earth in 1990. It may be routed to intercept Comet Grigg-Skjellerup in 1992.

Giotto, Sakigake, Suisei and the Vegas were specifically targeted to Comet Halley (Vega 1 and 2 dropped probes on Venus enroute). Several other spacecraft, already in orbit, took advantage of the Comet's proximity and diverted their instruments to observe it.

The International Ultraviolet Explorer (IUE) was the first to see Comet Halley from space. On Christmas eve, IUE detected an icy blast coming from the nucleus. Apparently a pocket of frozen carbon dioxide and carbon monoxide gas warmed to the bursting point, became ionized and streamed down the tail very fast.

Pioneer 12, stationed between the orbits of Earth and Venus 256 million km away, viewed Halley for 12 days as it sped toward the sun. Pioneer 12 imaged the gas cloud surrounding it and monitored the effects of solar radiation on the tail. The spacecraft was cut off by the sun on January 7, but resumed observations, January 30.The eight-year old spacecraft was the only orbiter positioned to witness the Comet at perihelion, 140.8 million km from the sun.

Pioneer 7, one of NASA's oldest functional spacecraft, flew within 12.3 million km of Halley on its outbound leg, March 20. It monitored the interaction between the cometary hydrogen tail and the solar wind.

The bevy of spacecraft and International Halley Watch observers provided a quantitative picture of the Comet's molecular composition and its interplay with the solar wind. The physical nature of the nucleus itself remains a mystery. Observations will continue through 1988. Data complied by the IHW is expected to fill 30,000 printed pages and a minimum 20,000 megabytes on compact discs. The comprehensive archive will be the best Halley resource available to astronomers until 2016, when Comet Halley returns.

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Compiled by L.R. Magnolia

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China's Long March Into Space

by Phillip S. Clark

China is traditionally considered the home of the rocket, having developed firecracker solid propellant rockets by medieval times. A Chinese inventor named Wan Hu is credited with an early manned spaceflight attempt. He tried a launch in a chair strapped to two rockets, but his heroic attempt was a failure.

The true Chinese space program began in 1956. That Spring, a 12-year development plan was set up to incorporate rocket and jet engine technology in key state projects. In October, China's first rocket research institute, led by Vice Chairman Zhou Enlai, was founded. In May 1958, Chairman Mao Zedong proposed that China develop satellites. On February 19, 1960, the first home-built Chinese sounding rocket was successfully fired; the following November saw the launching of a mock-up ballistic missile.

The Chinese Academy of Sciences established a space committee in 1963, and it began to investigate the possibility of a satellite launch. By July 1965, the Academy was drawing up development plans.

Launch Vehicles

Chinese satellite launch vehicles have been derived from military technology. The three-stage CZ-1 (Chang Zheng or Long March) booster is thought to have been based upon the CSS-3 two-stage missile, with a third stage added. The first stage has four engine chambers with a total thrust of about 140 metric tons. An improved CZ-1C has been developed but has not made an orbital flight.

The two-stage CZ-2 and FB-1 (Feng Bao or Storm) boosters are closely related. The CZ-2 is supposed to have more advanced electronics and a greater payload capacity than the FB-1, the latter being retired in 1981. The first stage is powered by four YF-2 engines, each with a 70-ton thrust; a single YF-2 powers the second stage. Dry mass of the first stage is about 10 tons and that for the second stage is 3.5 tons.

The largest operational Chinese booster is the CZ-3, used for geosynchronous satellite launches. It uses the two-stage CZ-2 with a liquid oxygen/liquid hydrogen third stage added. Designated YF-73, the engine has a 5-ton thrust, a nozzle expansion ratio of 5:1, a chamber pressure of 30 atmospheres and a specific impulse of a respectable 425 seconds For a nominal CZ-3 mission, first-stage ignition comes 3 seconds before lift-off

and firing continues until 129 seconds after launch; the second stage operates until 258 seconds after launch. The third stage fires twice: burning until 713 seconds after launch, then re-igniting 810 seconds after launch for a further 291 seconds.

Table 1. Chinese Satellite Launch Vehicles

Booster	Stage	Mass* (tons)	Propellants	Total Booster Length (meters)	Total Booster Diameter (meters)	Launch Mass (tons)
CZ-1**	1	52.5	UDMH/N_2O_4	29.45	2.25	81.6
	2	17.5	UDMH/N_2O_4			
	3	11	solid			
CZ-1C**	1	55	UDMH/N_2O_4	33	2.25	88
	2	20	UDMH/N_2O_4			
	3	12	liquid			
CZ-2/FB-1†	1	147.5	UDMH/N_2O_4	31.65	3.35	191
	2	40	UDMH/N_2O_3			
CZ-3‡	1	147.5	UDMH/N_2O_4	43.25	3.35	202
	2	40	UDMH/N_2O_4			
	3	12.5	LH_2/LOX			

*Individual stage masses are estimated.

**The CZ-1 can place 300 kg into a 70 degree, 440-km orbit. The CZ-1C has not yet flown, but is credited with 400 kg to either a 70 degree, 600-km orbit or a 400-km sun-synchronous orbit. Actual propellant combinations for the third stages of the CZ-1 and CZ-1C have not been announced.

†The FB-1 and CZ-2 are closely related. The FB-1 launched non-recoverable satellites and can place about 2 tons into a 63 deg, 200-2,500-km orbit. The more advanced CZ-2 can place up to 3 tons into a 63 deg, 200-400-km orbit.

‡The CZ-3 can place 1.4 tons into a geosynchronous transfer orbit at 31.1 deg, 200-35,786 km.

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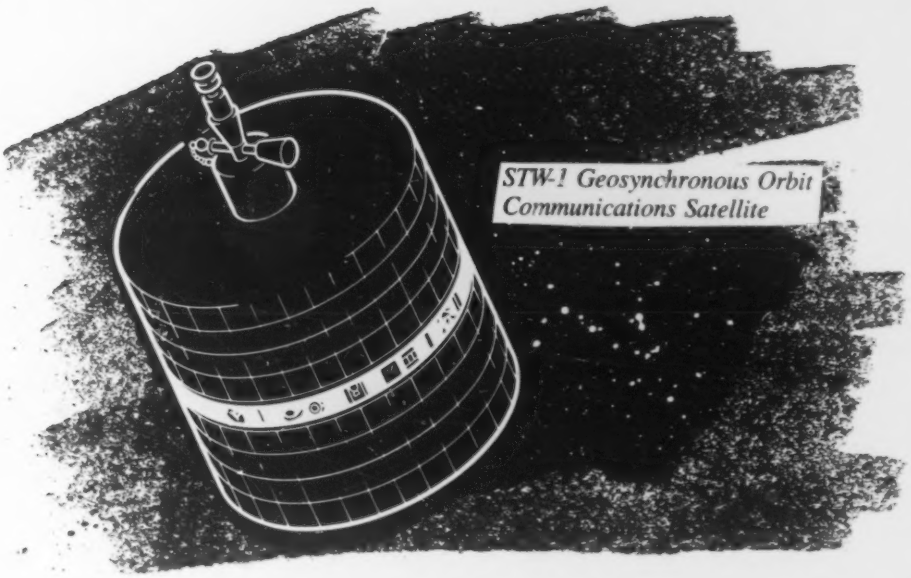


STW-1 Geosynchronous Orbit Communications Satellite

Launch Sites

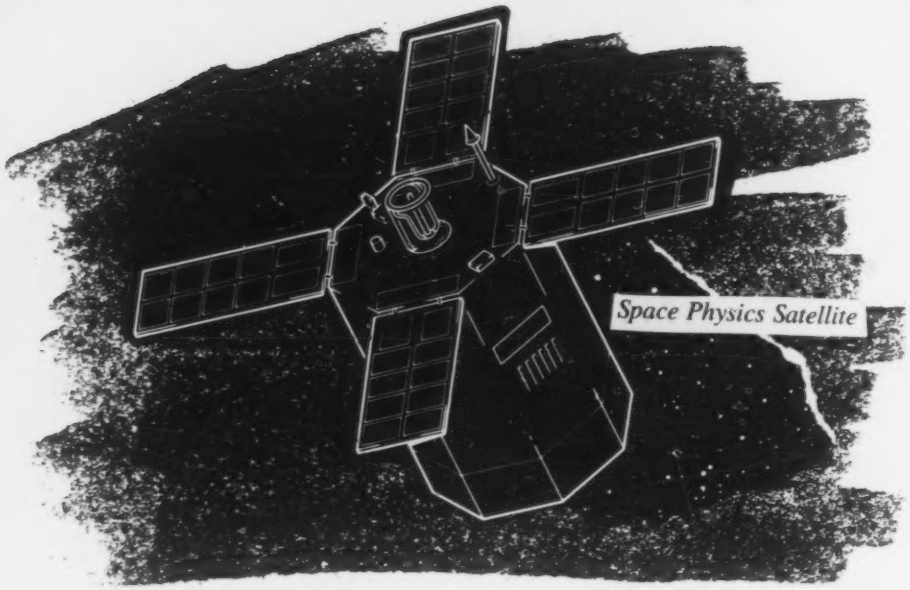
Two launch sites have been used for space missions. The original site, from which the CZ-1, CZ-2 and FB-1 boosters have flown is sometimes called Shuang Ch'eng Tzu in the West, although the Chinese now call it Jiuquan. It is situated in a desert region at 41 deg n, 100 deg e. The CZ-3 missions have used a newer launch site, identified as Xi Chang. It is located at 28 deg n, 102 deg e in a mountainous region. Launches from both sites have all been in a southeasterly direction.

In addition to ground-based tracking stations, the Chinese have adapted two research ships — Yuanwang 1 and 2 — for missile and space tracking. They are deployed downrange during launches rather than traveling the world as do Soviet space tracking ships.

Early Satellite Launches

It is reported that in November 1969, posters appeared in China welcoming a satellite launch, although nothing was placed in orbit. One may wonder whether there was a launch failure being prematurely celebrated.

A successful launch came in April 1970 (Table 2) with the launch of a satellite transmitting the propaganda tune, "The East is Red," as well as housekeeping telemetry. The Chinese later named the satellite, "Tungfanghung," although other Chinese sources call it SKW-1 (Shiyan Kexuedi Weixing — Space Physics Experiment). The next launch in this series came nearly a year later with a satellite later identified as Practice 1 or SKW-2. A scientific satellite, it was powered by solar cells and transmitted until its orbital decay in 1979.



(Drawings by R.F. Gibbons)

Table 2. Early Chinese Satellite Launches*

Launch Date	Satellite	Mass (kg)	Incl (deg)	Period (min)	Perigee (km)	Apogee (km)
Nov 1, 1969	SKW		Reported Launch Failure**			
Apr 24, 1970	Tungfanghung†	173	68.47	114.06	440	2,386
Mar 3, 1971	Practice 1†	221	69.90	106.15	267	1,830

*All used CZ-1 boosters.

**Not confirmed by Chinese

†Tungfanghung, Practice 1 also called SKW-1 and SKW-2 by the Chinese.

Large, Non-recoverable Satellites

Following the 1971 launch, no further Chinese payloads were orbited until July 1975. There is a reported launch failure in July 1974. Since the Chinese do not credit this to the CZ-2, it must have been the FB-1 variant with a non-recoverable payload. The July 1975 launch and a December 1975 mission sent two 2.5-ton payloads into orbit. They decayed seven to eight weeks after launch and may have been test beds for observation equipment later carried on recoverable satellites.The following August, a payload was launched into an eccentric orbit. It has not been fully explained. It may have been a minor military payload or a scientific satellite.

After a break of about three years, another FB-1 was launched, but it failed to reach orbit. It is rumored to have carried an astronomical payload. In an unusual step, the launch was announced by the Soviet Union.

The final FB-1 launch occurred in 1981 when three satellites, collectively designated SKW-9, were placed into eccentric orbits. One of the payloads was a metal sphere attached to a balloon; it rapidly decayed. The other payloads studied earth's atmosphere, magnetic field, energetic particles and various parts of the electromagnetic spectrum.

Table 3. Low orbit, Non-recoverable Satellites*

Launch Date	Satellite	Incl (deg)	Period (min)	Perigee (km)	Apogee (km)
Jul 12, 1974	SKW		Reported Launch Failure		
Jul 26, 1975	SKW-3	69.03	90.95	185	457
Dec 16, 1975	SKW-5	69.00	90.24	186	287
Aug 30, 1976	SKW-6	69.15	108.79	194	2,147
Jul 30, 1979	SKW		Reported Launch Failure**		
Sep 19, 1981	SKW-9A	59.41	103.29	232	1,597
Sep 19, 1981	SKW-9B	59.47	103.51	235	1.614
Sep 19, 1981	SKW-9C	59.52	103.33	235	1,598

*All launches used the FB-1.

**Reported by the Soviet Union.

Recoverable Observation Satellites

The Chinese have said that the first CZ-2 launch attempt came in November 1974, and that the booster was destroyed 20 seconds after launch. Since all subsequent CZ-2 missions carried recoverable satellites, presumably the 1974 failure was of the same type.

It was with the launch in November 1975, that the Chinese became the third nation after the U.S. and USSR to develop the technology to recover a satellite from orbit. SKW-4 was successfully recovered after six days, although part of it was left in space. The recoverable satellites are believed to have masses of up to 3 tons, while the descent craft are about 1.8—1.9 tons, shaped rather like the familiar beehive of the Soviet Soyuz.

There were further flights in the series in 1976 and 1978 and then annually starting in 1982. Originally, the satellites were believed to have been for military photo reconnaissance, but it is clear that each mission has carried at least some earth resources experiments. In fact, the satellites launched in 1985 and 1986 seem to have been dedicated earth resources missions.

Table 4. Recoverable Satellites*

Launch Date	Satellite	Lifetime** (days)	Incl (deg)	Period (min)	Perigee (km)	Apogee (km)
Nov 4, 1974	SKW		Confirmed Launch Failure			
Nov 16, 1975	SKW-4	33 (6)	62.97	91.10	178	479
Dec 7, 1976	SKW-7	26 (2)	59.46	91.08	171	484
Jan 26, 1978	SKW-8	12 (4)	57.05	91.06	168	485
Sep 9, 1982	SKW-10	12 (5)	62.99	90.18	174	392
Aug 19, 1983	SKW-11	15 (5)	63.31	90.12	172	389
Sep 12, 1984	SKW-12	17 (5)	67.94	90.25	174	400
Oct 21,1985	SKW-13	17 (5)	62.98	90.19	173	395
Oct 6, 1986	SKW-14	17 (5)	56.96	90.10	173	385

*All launches used the CZ-2.

**Lifetime figures for objects left in orbit after capsules are recovered: capsule lifetimes follow in parentheses.

The Communications Satellite Program

The Chinese hoped to launch geostationary satellites by 1981, but were delayed by technical and political reasons until 1984. Two satellite locations had been registered: STW-1 (Shiyan Tongxin Weixing — Experimental Communications Satellite) over 125 deg e and STW-2 over 70 deg e.

The first CZ-3 launch in January 1984 was intended to place a satellite into geostationary orbit, but the new high-energy third stage failed to re-ignite after the initial orbital injection. Rather than totally abandon the mission, the Chinese separated the satellite from the third stage and the payload performed maneuvers simulating geosynchronous orbital injection and stationkeeping (see Table 5).

The CZ-3 fault was investigated with a solution required by March 31, 1984. The successful completion of this study allowed a second launch to

place STW-1 into an operational orbit in April 1984. The satellite was still operating at the end of 1986, performing regular stationkeeping maneuvers. STW-1 had a mass of 900 kg in transfer orbit. After circularizing the orbit and changing its orbital plane, the mass was 420 kg on station.

It was nearly two years before another communications satellite was launched. The second successful mission placed the payload over 103 deg e rather than the expected STW-2 locations.

Table 5. Communications Satellite Program*

Launch Date	Satellite**		Incl (deg)	Period (min)	Perigee (km)	Apogee (km)
Jan 29, 1984	STW		31.04	92.05	290	460
		then	36.03	160.80	359	6,475
		then	36.17	163.59	481	6,580
Apr 8, 1984	STW-1		30.94	633.21	402	35,964
		then	0.72	1,444.55	35,521	36,383
		then	0.75	1,435.95	35,777	35,790
Feb 1, 1986	STW		31.07	631.01	438	35,546
		then	0.16	1,450.09	35,895	36,225
		then	0.11	1,435.98	35,779	35,790

*All launches used the CZ-3.

**The first failed to place the payload into a geosynchronous transfer orbit and was given no designation by the Chinese. The second, STW-1, was given the designation of the location over which it was stationed. No STW designation was given to the third launch. The second and third satellites have also been referred to as Tungfanghung and Tungfanghung 2, resulting in some confusion with a 1970 satellite of the same name.

Future Plans

The Chinese are in the initial planning stages for a large Saturn-1 class booster which they hope to operate in the late 1990s. In addition, plans are under way to modify the CZ-2 and CZ-3 boosters. Modifications to the CZ-3 could involve the addition of strap-on boosters to the first stage and/or a new solid propellant upper stage. Altering the first stage to include eight, not four, YF-2 engines, is also being investigated.

The variant of the CZ-2 currently in use is designated the CZ-2C, suggesting that there have been at least two earlier variants: the CZ-2A and the CZ-2B. Possibly one of these has also been designated the FB-1 (?).

New variants of the basic CZ-2 are being considered. One involves a booster compatible with the launching of a HS-399-type satellite, with a payload/apogee stage mass up to 1,710 kg, into geosynchronous transfer orbit. One of the new variants, designated the CZ-2D, uses a standard first stage, but a longer second stage. Launched from Xi Chang, the CZ-2D can place 3.9 tons in a 200-km, 28.5-degree orbit.

The most advanced version of the CZ-2 involves further extending the second stage and adding four or eight long strap-on boosters (non-separable) to the first stage. To be designated CZ-2/4L, the variant with four strap-ons could place 9 tons into a 200-km, 28-5 degree orbit. With eight strap-ons another variant (CZ-2/8L ?) could place 13 tons or more into such an orbit. With a new third stage added, the CZ-2/4L is designated the CZ-3/4L, and will be capable of placing up to 5,000 kg into a geosynchronous transfer orbit.

The Chinese are also planning a man-in-space program for the 1990s. It is possible that CZ-2/4L and Saturn-1 class boosters are being studied in support of that program. The first Chinese astronaut may not fly on a Chinese booster, however. Before the Challenger loss, there had been discussion that a Chinese astronaut might fly a shuttle mission; while in 1986, the Soviet Union hinted at a joint Sino-Soviet Soyuz TM mission.

Unmanned future activities include a ''Block-2'' communications satellite, planned for launch in 1987-1988, and meteorological satellites. The first could come in 1987, when a 700-kg satellite is scheduled for an 800-km, 98.9 degree orbit. More advanced meteorological satellites are projected for both polar and geosynchronous orbits. There are also plans to supplement the existing recoverable imaging satellite by introducing an image transmitting satellite in 1988-1990.

Commercial Considerations

The Chinese are trying to sell their launch vehicle technology internationally; they are in the market for commercial launching business. Although not demonstrated, the Chinese claim that they can launch 12 to 13 CZ-3 missions each year. At present, Xi Chang has only one launch pad for the CZ-3, but a second pad is being planned. Currently, the Chinese believe they can launch a CZ-3 every 35 days if launch demand requires it.

A number of companies have approached the Chinese regarding satellite launches, although it is uncertain how many will turn into hard orders. Much publicity has been given to plans for the Chinese to launch Palapa-B2 and Westar-6, originally launched on shuttle mission 41-B and, after Pam-D failures, recovered on mission 51-A. Pan Am Pacific Corporation plans to launch Westar 6 — renamed Pan Am Pacific 1 — using a CZ-3 before March 1988. Dominian Video hopes to launch a satellite using a CZ-3 before December 1987, and and a second before March 1988. Iran, too, has expressed interest in a launch.

The CZ-2 vehicle may be used to launch the Swedish Mailstar piggyback with an observation satellite. The Chinese are considering modifications to the CZ-2 to allow multiple small satellite launches to be conducted. Under current design studies, up to four satellites could be launched, one with a mass up to 1,000 kg, and three with 50 to 300-kg masses. The perigees would be 170 to 300 km, apogees 800 to 1,000 km, and the inclinations about 63 degrees (as used for observation satellites) or 99 degrees (similar to Chinese meteorological satellites).The Chinese space program has been slow to develop and, in the past, has been hindered by a lack of political commitment beyond the propaganda value that satellites can bring. Chinese leadership is now committed to an ongoing, well-planned and sufficiently funded program, the benefits from which can be reaped domestically. In addition, if the world takes up Chinese offers to launch satellites commercially, China's technological reputation can only increase.

China's Long March Into Space: A Selected Bibliography

Compiled by Phillip S. Clark

December 1986

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Manned Space Flight Records

	Total Flights	Earth Missions	Lunar Missions	Total Crew-hours
United States	55	46	9	42,453
USSR	59	59	–	104,374
Total	**114**	**105**	**9**	**146,827**

First manned flight: Vostok 1
First EVA: Voskhod 2
Longest mission: Soyuz T-5/T-7 (211 days, 9 hrs, 05 mns)
First rendezvous mission: Gemini 7 and 8
First docking flight: Gemini 8
First lunar orbit: Apollo 8
First crew exchange: Soyuz 4,5
First manned lunar landing: Apollo 11
First triple launch/manned: Soyuz 6,7,8

Heaviest manned spacecraft: Skylab 1 (164,597 lb)
First use of reusable manned spacecraft: STS 1
First modular space station assembly: Salyut 7/Kosmos 1443
First space station repair: Solyut 7/Soyuz T-13
First retrieval, repair of satellite: STS 41-C
First space construction: STS 61-B
First station to station crew transfer: Mir/Soyuz T-15 to Salyut 7

Worldwide Successful Space Launches

Year	USSR	US†	France	Australia	China	Japan	UK	ESA**	India	Total
1957	2									2
1958	1	7								8
1959	3	11								14
1960	3	16								19
1961	6	29								35
1962	20	52								72
1963	17	38								55
1964	30	57								87
1965	48	63	1							112
1966	44	73	1							118
1967	66	58*	2	1						127
1968	74	45								119
1969	70	40								110
1970	81	29*	2		1	1				114
1971	83	32*	1		1	2	1			120
1972	74	31*				1				106
1973	86	23								109
1974	81	24*				1				106
1975	89	28*	3		3	2				125
1976	99	26			2	1				128
1977	98	24				2				124
1978	88	32			1	3				124
1979	87	16				2		1		106
1980	89	13				2			1	105
1981	98	18			1	3		2	1	123
1982	101	18			1	1				121
1983	98	23‡			1	3		1‡	1	127
1984	97	22			3	3		4		129
1985	98	17			1	2		3		121
1986	91	6			2	2		2		103
Total	**1,922**	**871**	**10**	**1**	**17**	**31**	**1**	**13**	**3**	**2,869**

* Italy has launched eight spacecraft from its San Marco platform. U.S. Scout rockets were used for these launches, so NASA includes them in the U.S. launch total.

** European Space Agency

† Does not include payloads launched from space shuttle.

‡ ESA launch from WSMC used U.S. Delta 3914 and is included in U.S. total

Table based on information reported by the Science Policy Research Division, Library of Congress

Box Score of U.S. Launches

Worldwide record of known successful U.S. launches

International payloads are listed when launched by U.S. booster

Classified U.S. payloads are listed by launch vehicle

*Payload(s) injected into orbit

1957	1958	1959	1960	1961
Vanguard TV 3	Score	Discoverer 8	Discoverer 19	Atlas Agena B
	Pioneer 3	Discoverer 7	Discoverer 18	Discoverer 36
	Pioneer 1	Explorer 7	Tiros 2	Mercury Atlas 5
	Explorer 4	Vanguard 3	Discoverer 17	Ranger 2
	Explorer 3	Discoverer 6	Explorer 8	Transit 4B
	Vanguard 1	Discoverer 5	Courier 1B	Discoverer 35
	Explorer 1	Explorer 6	Discoverer 15	Discoverer 34
		Discoverer 2	Discoverer 14	Midas 4
	Pioneer 2	Pioneer 4	Echo 1	Discoverer 32
	Beacon 1	Discoverer 1	Discoverer 13	Discoverer 31
	Vanguard SLV 3	Vanguard 2	Transit 2A	Mercury Atlas 4
	Explorer 5		Midas 2	Discoverer 30
	Able 1	Atlas Able 4	Discoverer 11	Discoverer 29
	Vanguard SLV 2	Transit 1A	Transit 1B	Explorer 13
	Vanguard SLV 1	Beacon 2	Tiros 1	Ranger 1
	Vanguard TV 5	Explorer S-1	Pioneer 5	Explorer 12
	Explorer 2	Discoverer 4		Midas 3
	Vanguard TV 3A	Vanguard SLV 6	Atlas Able 5B	Tiros 3
		Discoverer 3	Explorer S-56	Discoverer 26
		Vanguard SLV 5	Transit 3A	Transit 4A
			Discoverer 16	Discoverer 25
			Samos 1	Explorer 11
			Atlas Able 5A	Discoverer 23
			Courier 1A	Explorer 10
			Discoverer 12	Transit 3B
			Echo A 10	Discoverer 21
			Explorer S-46	Discoverer 20
			Midas 1	Explorer 9
			Discoverer 10	Samos 2
			Discoverer 9	
				Atlas Agena B
				Mercury Scout 1
				Discoverer 33
				Samos 3
				Discoverer 28
				Discoverer 27
				Explorer S-55
				Discoverer 24
				Explorer S-45A
				Mercury Atlas 3
				Discoverer 22
				Explorer S-45
*Successes: 0	*Successes: 7	*Successes: 11	*Successes: 16	*Successes: 29
Failures: 1	Failures: 10	Failures: 8	Failures: 13	Failures: 12
Total: 1	Total: 17	Total: 19	Total: 29	Total: 41

Transit 5A
Explorer 16
Thor Agena D
Relay 1
Thor Agena D
Thor Agena D
Thor Agena B
Atlas Agena B
Thor Agena B
Anna 1B
Explorer 15
Starad
Ranger 5
Thor Agena B
Mercury Atlas 8
Explorer 14
Thor Agena D
Alouette 1
Tiros 6
Thor Agena B
Thor Agena B
Thor Agena D
Mariner 2
Scout
Atlas Agena B
Thor Agena D
Thor Agena B
Thor Agena B
Atlas Agena B
Telstar 1
Thor Agena D
Thor Agena B
Tiros 5
Thor Agena B
Atlas Agena B
Thor Agena B
Thor Agena B
Mercury Atlas 7
Thor Agena B
Thor Agena B
Atlas Agena B
Ariel 1
Ranger 4
Thor Agena B
Atlas Agena B
Atlas Agena B
OSO 1
Discoverer 38
Thor Agena B
Mercury Atlas 6
Tiros 4
Ranger 3

Atlas Agena B
Mariner 1
Scout
Anna 1A
Solrad 4B
Composite 1
Discoverer 37

*Successes: 52
Failures: 7
Total: 59

1962

TAT Agena D
Tiros 8
Explorer 19
Atlas Agena D
Thor Able Star
Thor Agena D
Atlas Centaur 2
Explorer 18
TAT Agena D
Atlas Agena D
Vela 1 & 2
Thor Able Star
TAT Agena D
Atlas Agena D
Thor Agena D
TAT Agena D
TAT Agena D
Syncom 2
Atlas Agena B
Thor Agena D
Atlas Agena D
TAT Agena B
Geophysical Research Satellite
TAT Agena D
Tiros 7
Scout
Thor Agena D
TAT Agena D
TAT Agena D
Mercury Atlas 9
Atlas Agena B
Telstar 2
Explorer 17
Thor Agena D
Scout
Syncom 1
Thor Agena D
Thor Agena D

Thor Agena D
Scout
Atlas Agena B
Thor Agena D
Scout
Scout
TAT Agena D
TAT Agena D

*Successes: 38
Failures: 8
Total: 46

1963

TAT Agena D
Explorer 26
TAT Agena D
San Marco 1
Thor Able Star
Atlas Centaur 4
Transtage
Atlas Agena D
Mariner 4
Explorer 24 & 25
TAT Agena D
Explorer 23
Mariner 3
TAT Agena D
TAT Agena D
Atlas Agena D
TAT Agena D
Explorer 22
Thor Able Star
TAT Agena D
Explorer 21
Atlas Agena D
Saturn SA-7
TAT Agena D
OGO 1
Nimbus 1
Explorer 20
TAT Agena D
Syncom 3
Atlas Agena D
TAT Agena D
Ranger 7
Vela 3 & 4
TAT Agena D
Atlas Agena D
TAT Agena D
TAT Agena D
Thor Agena D
TAT Agena D
TAT Agena D
Scout
Saturn SA-6
Atlas Agena D
TAT Agena D
Atlas Agena D
Gemini Titan 1
Ariel 2
Atlas Agena D
TAT Agena D
Atlas Agena D
TAT Agena D
Ranger 6
Saturn SA-5
Echo 2
Relay 2
Thor Agena D
TAT Agena D

Atlas Agena D
Environmental Sciences Research Satellite
Thor Able Star
TAT Agena D
Beacon Explorer A

*Success: 57
Failures: 5
Total: 62

1964

TAT Agena D
Scout
LES 3, 4 et. al.
Pioneer 6
Gemini 6
TAT Agena D
FR 1
Gemini 7
Alouette 2 et. al.
Explorer 30
Atlas Agena D
Explorer 29
TAT Agena D
OV2 1, LCS 2
OGO 2
TAT Agena D
OV1 2
Atlas Agena D
TAT Agena D
Thor Altair
Gemini 5
TAT Agena D
Surcal et. al.
Atlas Centaur 6
Secor 5
Atlas Agena D
Pegasus 3
Vela 5 & 6
TAT Agena D
TAT Agena D
Tiros 10
Atlas Agena D
Thor Able Star
Titan IIIC
TAT Agena D
Gemini 4
Explorer 28
Atlas Agena D
Pegasus 2
Thor Altair
TAT Agena D
LES 2, ECS 1
TAT Agena D
Explorer 27
Atlas Agena D
Early Bird
Snapshot
TAT Agena D
Gemini 3
Ranger 9
Thor Altair
Atlas Agena D
Thor Able Star
GGS 2 & 3 et. al.
TAT Agena D
Ranger 8
Pegasus 1
LES 1
OSO 2
Atlas Agena D
Tiros 9
Thor Altair
TAT Agena D

Gemini 6 Target
TAT Agena D
OSO C
Atlas Agena D
OV1 3
OV1 1

*Successes: 63
Failures: 6
Total: 69

1965

TAT Agena D
Biosatellite 1
Titan IIIB Agena D
OV1 9 & 10
ATS 1
Atlas Agena D
Gemini 12
Gemini 12 Target
TAT Agena D
Lunar Orbiter 2
OV4 3 et. al.
Atlas Agena D
OV3 2
Atlas Centaur 9
Intelsat IIA
Atlas Agena D
EGRS 8
ESSA 3
Titan IIIB Agena D
TAT Agena D
Surveyor 2
Atlas Agena D
Thor Burner II
Gemini 11
Gemini 11 Target
ERS 15
Scout
Pioneer 7
Atlas Agena D
Lunar Orbiter 1
Thorad Agena D
OV3 3
Titan IIIB Agena D
Gemini 10
Gemini 10 Target
OV1 8
Atlas Agena D
Saturn I
Explorer 33
Pageos
TAT Agena D
IDCSP 1-7, GGTS 1
OV3 4
Secor 6, ERS 16
OGO 3
Atlas Agena D
Gemini 9
Gemini 9, Target B
Surveyor 1
Explorer 32
TAT Agena D
Scout
Nimbus 2
Atlas Agena D
OV3 1
Atlas Agena D
OAO 1
Atlas Centaur
TAT Agena D
Thor Altair
OV1 4 & 5
Scout
Atlas Agena D
Gemini 8
Gemini 8 Target
TAT Agena D
ESSA 2
Atlas Agena D
TAT Agena D
ESSA 1
TAT Agena D
Scout
Atlas Agena D

IDCSP (8 satcoms)
Gemini 9 Target A
TAT Agena D
Thor Altair

*Successes: 73
Failures: 4
Total: 77

1966

1967	1968	1969	1970	1971
Pioneer 8	Apollo 8	Thorad-Agena D	Explorer 42	Intelsat IV F-3
LTTAT-Agena D	Intelsat IIIB	Skynet 1	NOAA-1	Thorad-Agena D
Titan IIIB-Agena D	ESSA 8	Apollo 12	Thorad-Agena D	Ariel 4
OV3 6	LTTAT-Agena D	Azur 1 (GRS A)	OFO 1, RM	Explorer 45
ESSA 6	OAO 2	Titan IIIB-Agena D	Titan IIIC	OSCS 1, 2
Apollo 4	HEOS 1	Boreas (ESRO 1B)	Titan IIIB-Agena D	Titan IIIB-Agena D
Surveyor 5	Titan IIIB-Agena D	LTTAT-Agena D	Thor-Burner II	NOAA 2
ATS 3	Pioneer 9, TETR 2	LTTAT-Agena D	Thor-Agena D	Space Test Program
LTTAT-Agena D	Titan IIIB-Agena D	Titan IIIB-Agena D	Scout	Thor-Burner II
Titan IIIB-Agena D	TAT-Agena D	ATS 5	Thorad-Agena D	OSO 7, TETR 4
OSO 4	Thor-Burner II	OSO 6, PAC 1	Skynet II	LTTAT-Agena D
Thor-Burner II	Apollo 7	LTTAT-Agena D	Titan IIIB-Agena D	EOLE 1
Intelsat IID	LTTAT-Agena D	Intelsat IIIE	Intelsat III F-8	Titan 111B-Agena D
Scout	Aurorae (ESRO 1A)	LTTAT-Agena D	Titan IIIB-Agena D	OV1-20 et. al.
Titan IIIB-Agena D	OV2 5 et. al.	Thor-Burner II	Titan IIIB-Agena D	Apollo 15, P&F
LTTAT-Agena D	TAT-Agena D	Apollo 11	Atlas-Agena D	Thorad-Agena D
Surveyor 5	Titan IIIB-Agena D	Biosatellite 3	Thor-Agena D	Explorer 44
Biosatellite 2	ESSA 7	Explorer 41	Intelsat III F-7	Titan IIID
Thor-Burner II	ATS 4	OGO 6	Titan IIIB-Agena D	LTTAT-Agena D
Titan IIIB-Agena D	Explorer 39 & 40	Titan IIIB-Agena D	Apollo 13	Mariner 9
LTTAT-Agena D	LTTAT-Burner II	Vela 9, 10 et. al.	Vela 11, 12	Titan IIIC
Lunar Orbiter 5	Titan IIIB-Agena D	Intelsat IIID	Nimbus 4, TOPO 1	San Marco 3
OGO 4	Atlas-Agena	Apollo 10	NATO 1	Titan IIIB-Agena D
OV1 12 & 86	OV1 15 & 16	LTTAT-Agena D	Thorad-Agena D	ISIS 2
TAT-Agena D	Explorer 38	Titan IIIB-Agena D	Thor-Burner II	LTTAT-Agena D
Explorer 35	LTTAT-Agena D	Nimbus 3, Secor 13	SERT 2	Titan IIIB-Agena D
Surveyor 4	IDSCS 19-26	Atlas-Agena D	ITOS 1, Oscar 5	Explorer 43
ISCSP 16-18 et. al.	Titan IIIB-Agena D	Mariner 7	Intelsat III F-6	Thor-Burner II
Secor 9, Aurora 1	Thor-Burner II	LTTAT-Agena D	Titan IIIB-Agena D	NATO 2
Titan IIIB-Agena D	Iris (ESRO 2B)	OV1 17,18 19 & 17A		Apollo 14
LTTAT-Agena D	LTTAT-Agena D	Titan IIIB-Agena D		Intelsat IV F-2
Mariner 5	Titan IIIB-Agena D	Aplio 9		Titan IIIB-Agena D
Atlas-Agena D	OV1 13 & 14	ESSA 9		
GGSE 4, 5 et. al.	Apollo 6	Mariner 6		
Explorer 34	LTTAT-Agena D	Tacsat 1		Atlas Agena D
Atlas-Agena D	Titan IIIB-Agena D	Intelsat IIIC		PAET Probe
Scout	Explorer 37	LTTAT-Agena D		Mariner H
LTTAT-Agena D	OGO 5	ISIS 1		Thorad-Agena D
Ariel 3	Scout	Titan IIIB-Agena D		
Lunar Orbiter 4	LTTAT-Agena D	OSO 5		
Vela 7, 8 et. al.	Apollo 5			
San Marco 2	Titan IIIB-Agena D			
ESSA 5	TAT-Agena D			
Surveyor 3	Explorer 38			
Scout	Surveyor 7			
ATS 2				
TAT-Agena D				
Intelsat IIC				
OSO 3				
Titan IIIB-Agena D				
TAT-Agena D				
Thor-Burner II				
Lunar Orbiter 3				
Atlas-Agena D				
ESSA 4				
IDCSP 8-15				
TAT-Agena D				
Intelsat IIB				
ESRO 2A	Intelsat IIIA	Pioneer E, TETRC	OAO 8	
Titan IIIB-Agena D	OV5 8 et. al.			
OV3 5	Nimbus B, Secor 10			
*Successes: 58	*Successes: 45	*Successes: 40	*Successes: 29	*Successes: 32
Failures: 3	Failures: 3	Failures: 1	Failures: 1	Failures: 4
Total: 61	Total: 48	Total: 41	Total: 30	Total: 36

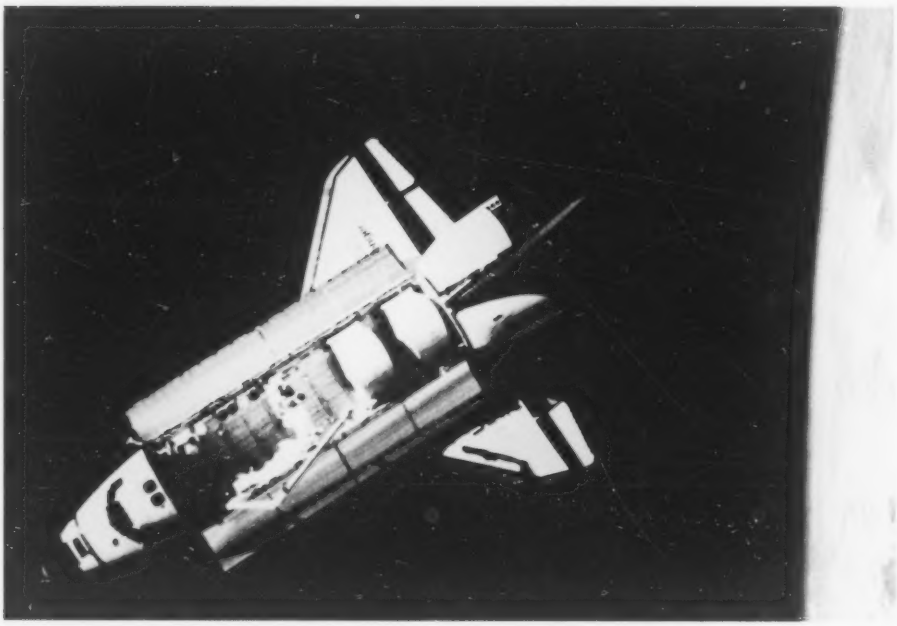
1972	1973	1974	1975	1976
Titan 38 Agena	Explorer 51	Symphonie	Titan IIIC	Titan IIID
Atlas-Agena	DSCS II	Helios	RCA Satcom 1	Marisat 3
Aeros	Skylab 4	Skynet 2B	Titan IIID	Titan IIIB-Agena
Nimbus 5	Titan IIID	Intelsat IV F-8	Explorer 55	AMS 1
Apollo 17	NOAA 3	NOAA	GOES 1	TIP 3
ESRO IV	Mariner 10	Titan IIID	TIP 2	Satellite Data Sys. 2
Explorer 48	Transit	Ariel 5	Titan IIIB	NOAA 5
ANIK 1	Explorer 50	Wester B	Explorer 54	Comstar 2
Thor-Burner Ii	Titan IIIB-Agena D	ANS	Intelsat IVA F-1	Palapa 1
NOAA 2, OSCAR 6	Intelsat IV F-7	Titan IIIB-Agena	Viking 2	Titan IIID
Titan IIID	Titan IIIB-Agena D	Thor-Burner IIA	Symphonie B	Titan IIIC
Atlas F-Burner II	Thor-Burner II	Aeros 2	Viking 1	Marisat 2
Explorer 47	Skylab 3	Timation 3	COS B	Titan IIIB
Scout	Titan IIID	Titan IIIB-Agena	Apollo 18	P76-5
Titan IIIB-Agena	Titan IIIC	Hawkeye	OSO 8	Comstar 1
OAO 3	Explorer 49	ATS 6	Atlas-Agena	Lageos 1
Explorer 46	Skylab 2	SMS 1	Nimbus 6	Atlas
ERTS 1	Titan IIIB-Agena D	Westar A	SSU 1	Nato IIIA
Titan IIID	Skylab 1	Titan IIID	DMSP	RCA Satcom 2
Intelsat IV F-5	Anik 2	Thor-Burner IIA	Intelsat IV F-1	Titan IIIB-Agena D
Thorad-Agena	Pioneer 11	UK X4 (Miranda)	DSCS II	Titan IIIC
Thorad-Agena	Titan IIID	San Marco 4 (C2)	ANIK 3	Marisat 1
Apollo 16, P&F	Atlas-Agena D	Titan IIIB-Agena	Explorer 53	Thor-Burner 2
Thor-Burner II		Skynet 2A	Titan IIIB	Intelsat IVA F-2
Titan IIIB			GEOS 3	CTS
TD 1A			Titan IIIB	Helios 2
Pioneer 10			SMS 2	
Titan IIIC			Landsat 2	
HEOS A2				
Intelsat F IV				
Titan IIID				
Titan IIIB-Agena	ITOS-E	Titan IIIB	Atlas F	DMSP
Titan IIIB-Agena	Titan IIIB-Agena D	Viking Proof Test	Intelsat IV F-6	
*Successes: 31	*Successes: 23	*Successes: 24	*Successes: 28	*Successes: 26
Failures: 2	Failures: 2	Failures: 2	Failures: 2	Failures: 1
Total: 33	Total: 25	Total: 26	Total: 30	Total: 27

1977	1978	1979	1980	1981
Sakura	Anik 4			Intelsat V F-3
Atlas-Agena D	DSCS II F			RCA Satcom IIIR
NOSS-2	GPS-4			Columbia (STS-2)
Meteosat 1	NATO IIIC			Titan IIIC
Transit	HEAO 2			SME and UOSAT
ISEE 1 & 2	Nimbus 7/Cameo			SBS 2
Titan IIIB	Tiros N			Titan IIID
Voyager 1	GPS 3			FLTSATCOM 5
Sirio	ISEE 3			Dynamic Explorer 1 & 2
Voyager 2	Pioneer Venus/Multiprobe			NOAA 7
HEAO-1	Titan IIIB-Agena D			Intelsat V F-1
Himawari (GMS-1)	GEOS 2			GOES 5
Titan IIID	Comstar 3			Nova 1
NTS-2	Seasat 1			Titan IIIB-Agena D
GOES-2	GOES 3			Columbia (STS-1)
DMSP	Titan IIID			Titan IIIC
Intelsat IVA F-4	Titan IIIC			Titan IIIB-Agena D
Atlas-Agena	Pioneer Venus/Orbiter			Comstar D-4
DSCS II	NDS 2	Satcom 3		
GEOS	OTS-2	DSCS II		
Titan IIIB	DMSP	Magsat	Titan IIIB-Agena	
Palapa 2	HCMM	Titan III C	Intelsat V F-2	
Titan IIIC	YURI	HEAO 3	SBS-1	
Nato IIIB	BMEWS II	Westar 3	FLTSATCOM 4	
	Intelsat IVA F-6	NOAA 6	GOES 4	
	Titan IIID	Titan IIIC	Titan IIID	
	Landsat 3/Oscar 8	DMSP	NOAA-B(7)	
	Titan IIIB-Agena 4	UK 6	GPS-6	
	NDS-1	Titan IIIB	Atlas F	
	FLTSATCOM 1	FLTSATCOM 2	Solar Max	
	IUE	Titan IIID	GPS-5	
	Intelsat IVA F-3	P78-1	Titan IIID	
		SAGE	FLTSATCOM 3	
Intelsat IVA		SCATHA		NAVSTAR GPS
OTS	DSCS II			
*Successes: 24	*Successes: 32	*Successes: 16	*Successes: 13	*Successes: 18
Failures: 2	Failures: 1	Failures: 0	Failures: 0	Failures: 1
Total: 28	Total: 33	Total: 16	Total: 13	Total: 19

STS Launched Satellites
(not included in launch totals)

1982	1983	1984	1985	1986
Anik C3 & SBS-3 launched by PAM-d (STS-5)	TDRS launched by IUS (STS-6) Anik C2 and Palapa B1 launched by Pam-D (STS-7) Insat 1B launched by Pam-D (STS-8)	LDEF by RMS (STS 41-C) SBS4 by Pam-D, (STS 41-D) Leasat 1 by PKM (STS 41-D) Telstar 3C by Pam-D (STS 41-D) ERBS by RMS (STS 41-G) Anik D2 by Pam-D (STS 51-A) Leasat 2 by PKM (STS 51-A)	Anik C1 by Pam-D (STS 51-D) Leasat 3 by PKM (STS 51-D) Nusat (STS 51-B) Morelos 1 by Pam-D (STS 51-G) Arabsat 1B by Pam-D (STS 51-G) Telstar 3D by Pam-D (STS 51-G) Aussat 1 by Pam-D (STS 51-I) ASC 1 by Pam-D (STS 51-I) Leasat 4 by PKM (STS 51-I) Morelos 2 by Pam-D (STS 61-B) Aussat 2 by Pam-D (STS 61-B) Satcom K-2 by Pam D2 (STS 61-B) Glomr (STS 61-A)	Satcom K-1 by Pam-D2 (STS 61-C)
Atlas E STS-5 Titan IIID RCA Satcom V Intelsat V F-5 Anik D-1 Landsat 4 STS 4 Westar V Titan IIID Insat 1A STS-3 Titan IIIC Intelsat V F-4 Westar VI Titan III RCA Satcom IV	STS-9 Atlas F Intelsat V F-7 Galaxy 2 RCA Satcom VII STS-8 Titan IIIB-Agena D Telstar 301 (J-1) Atlas F Galaxy 1 Scout Titan IIID STS-7 Atlas Exosat Intelsat V F-6 GOES 6 Titan IIIB RCA Satcom VI STS-6 NOAA-8 Atlas IRAS	Titan 34D Nato 3D STS 51-A Nova 3 STS 41-G Galaxy 3 Navstar 10 STS 41-D Titan IIIB Ampte 1,2,3 Titan 34D Navstar 9 Intelsat VA F-9 Titan IIIB Titan 34D STS 41-C Intelsat VA F-8 Uosat 2 Landsat 5 Atlas F STS 41-B Titan 34D	Scout STS 61-B STS 61-A Navstar 11 STS 51-J Intelsat VA F-12 STS 51-I Scout STS 51-F Intelsat VA F-11 STS 51-G STS 51-B STS 51-D Intelsat VA F-10 Geosat Titan IIIB STS 51-C Titan IIIB	FltSatCom 7 Polar BEAR NOAA-10 Delta Atlas F STS 61-C GOES 7 Titan 34D STS 51-L
*Successes: 18 Failures: 0 Total: 18	*Successes: 23 Failures: 0 Total: 23	*Successes: 22 Failures: 0 Total: 22	*Successes: 17 Failures: 1 Total: 18	*Successes: 6 Failures: 3 Total: 9

STS Payload Deployment Record 1982-1986



Year	Successes*	Failures	Total
1982	2	0	2
1983	4	1**	5
1984	8	2†	10
1985	18	1‡	19
1986	1	0	1
Total	**33**	**4**	**37**

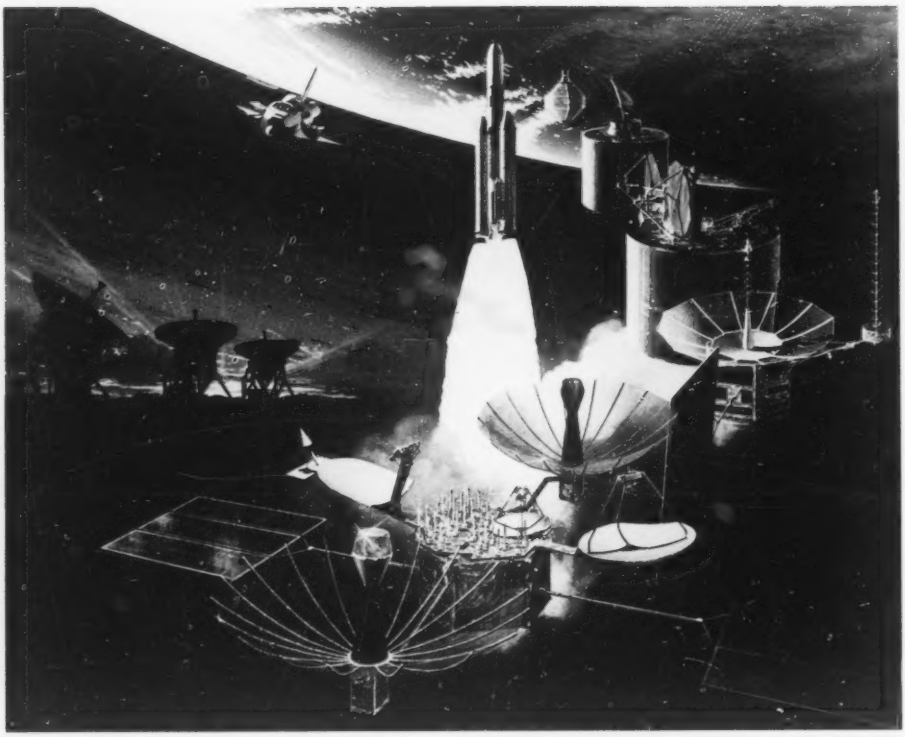
*Includes satellites, platforms, experiments

**IUS failure cast Tracking and Data Relay Satellite into incorrect orbit; spacecraft subsequently boosted to geosynchronous orbit using its own thrusters

†Perigee kick motor failures. Westar VI and Palapa B returned to earth on later STS mission

‡Faulty switch prevented perigee kick motor firing; Leasat 3 repaired on orbit on later STS mission and successfully boosted into geosynchronous orbit

Payloads in Orbit



Australia	3	Japan	31
Brazil	2	Mexico	2
Canada	14	NATO	6
ESA	15	PRC	4
France	14	Saudi Arabia	2
France/FRG	2	Spain	1
FRG	5	Sweden	1
India	7	UK	9
Indonesia	3	US	520
ITSO	35	USSR	978
Italy	1		
Subtotal	101	Subtotal	1,554
Total			**1,655**

As of December 31, 1986

Summary Log of Space Launches

The Summary Log lists all known orbital launches through December 31, 1986. Data was compiled from the Goddard Space Flight Center *Satellite Situation Report*; Teledyne Brown Engineering's *The Soviet Year in Space 1986*; The Royal Aircraft Establishment *Table of Artificial Satellites*; The British Planetary Society's *Spaceflight*; The Science Policy Division, Congressional Research Service, Library of Congress; and public announcements from agencies responsible for project direction. While every effort is made to verify the accuracy of the data, some information varies from source to source and discrepancies may occur.

Launch date: Universal time
Launch Site: ESMC = Eastern Space and Missile Center, Cape Canaveral, Fl
KSC = Kennedy Space Center, Fl
WSMC = Western Space and Missile Center, Vandenberg AFB, CA
STS = Space Transportation System
Weight: Launch weight in kilograms unless otherwise indicated; Soviet weights are approximate
Period: Minutes
Perigee and apogee: Kilometers
Inclination: Degrees to the equator

Summary Log of Space Launches 1986

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1715	1986 001A	USSR	Jan 8	Plesetsk	A-2	6,000	89.4	226	263	72.8	Photo recon. Recovered 1/22
Kosmos 1716	1987 002A	USSR	Jan 9	Plesetsk	C-1	40	115.5	1,462	1,490	74.0	Communications; 8-satellite launch
Kosmos 1717	1986 002B	USSR	Jan 9	Plesetsk	C-1	40	115.8	1,472	1,512	74.0	Communications
Kosmos 1718	1986 002C	USSR	Jan 9	Plesetsk	C-1	40	115.6	1,475	1,497	74.0	Communications
Kosmos 1719	1985 002D	USSR	Jan 9	Plesetsk	C-1	40	115.3	1,453	1,482	74.0	Communications
Kosmos 1720	1985 002E	USSR	Jan 9	Plesetsk	C-1	40	115.1	1,439	1,482	74.0	Communications
Kosmos 1721	1986 002F	USSR	Jan 9	Plesetsk	C-1	40	115.0	1,425	1,481	74.0	Communications
Kosmos 1722	1986 002G	USSR	Jan 9	Plesetsk	C-1	40	114.8	1,411	1,481	74.0	Communications
Kosmos 1723	1986 002H	USSR	Jan 9	Plesetsk	C-1	40	114.6	1,398	1,479	74.0	Communications
STS 61-C	1986 003A	US	Jan 12	KSC	Columbia	32,462*	91.3	327	350	28.5	Crew:Robert Gibson, Charles Bolden, Steve Hawley, George Nelson, Robert Cenker, Franklin Chang-Diaz, Bill Nelson; Deployed 1 satellite. Returned 1/18 after 6 days, 2 hrs, 4 mns
Satcom K-1	1986 003B	US	Jan 12	STS	Pam D2	1,923	1,436.2	35,781	35,794	0.0	Commercial communications. Positioned above 81 deg. w long
Kosmos 1724	1986 004A	USSR	Jan 15	Plesetsk	A-2	6,000	89.2	168	334	67.1	Photo recon. Recovered 3/15
Kosmos 1725	1986 005A	USSR	Jan 17	Plesetsk	C-1	700	104.8	1,001	967	82.9	Navigation. Replaced Kosmos 1577
Kosmos 1726	1986 006A	USSR	Jan 17	Plesetsk	F-2		97.6	628	660	82.5	Elint. Replaced Kosmos 1606
Raduga 18	1986 007A	USSR	Jan 17	Tyuratam	D-1-e	2,000	1,436.2	35,781	35,797	0.3	Domestic communications. Stationed above 335 deg. e long
Kosmos 1727	1986 008A	USSR	Jan 23	Plesetsk	C-1	700	104.8	958	1,013	82.9	Navigation. Replaced Kosmos 1506
Kosmos 1728	1986 009A	USSR	Jan 28	Tyuratam	A-2	6,000	89.4	223	270	70.0	Photo recon. Recovered 2/11
STS 51-L		US	Jan 28	KSC	Challenger						Vehicle destroyed by explosion 73 seconds after launch. Astronauts Francis Scobee, Michael Smith, Ronald McNair, Ellison Onizuka, Greg Jarvis, Christa McAuliffe, Judith Resnik perished. Failure traced to O-ring seal
PRC 18	1986 010A	PRC	Feb 1	Xi Chang	Long March 3		1,435.9	35,779	35,790	0.1	Domestic communications. Stationed above 103 deg. e long

*Payload weight in pounds. Total weight including main engine, boosters, fuel was 4,516,465 lbs.

Summary Log of Space Launches 1986

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1729	1986 011A	USSR	Feb 1	Plesetsk	A-2-e	1,250	718.0	798	39,567	63.2	Early warning; Replaced Kosmos 1569
Kosmos 1730	1986 012A	USSR	Feb 4	Plesetsk	A-2	6,000	89.6	224	280	72.9	Military photo recon. Recovered 2/13
Kosmos 1731	1986 013A	USSR	Feb 7	Tyuratam	A-2	2,500	89.9	183	269	64.8	Military photo recon. Reentered 10/3
None	1986 014A	US	Feb 9	WSMC	Atlas F		elements not available				
Kosmos 1732	1986 015A	USSR	Feb 11	Plesetsk	F-2		116.0	1,477	1,524	73.6	Geodetic
BS-2B	1986 016A	Japan	Feb 12	Tanegashima	N-II	677	1,436.2	35,774	35,802	0.0	Domestic communications. Placed above 117 deg. e long
Mir	1986 017A	USSR	Feb 19	Tyuratam	D-1	20,100	91.2	333	340	51.6	Soviet space station; occupied by Leonid Kizim, Vladimir Solovyov, 3/15-5/6 and 6/27-7/16
Kosmos 1733	1986 018A	USSR	Feb 19	Plesetsk	F-2		97.7	632	663	82.5	Elint. Replaced Kosmos 1544
SPOT 1	1986 019A	France	Feb 22	Kourou	Ariane 1	1,830	101.4	824	828	98.7	Remote sensing for earth resources, commercial use
Viking	1986 019B	Sweden	Feb 22	Kourou	Ariane 1	538	261.7	790	13,359	98.8	Studying magnetic, electric, ultraviolet properties of auroral regions
Kosmos 1734	1986 020A	USSR	Feb 26	Plesetsk	A-2	6,000	89.1	163	348	67.1	Military photo recon. Reentered 4/26
Kosmos 1735	1986 021A	USSR	Feb 27	Tyuratam	F-1-m		92.7	401	416	65.0	Ocean surveillance
Soyuz T-15	1986 022A	USSR	Mar 13	Tyuratam	A-2	7,000	91.2	352	339	51.6	Cosmonauts Leonid Kizim, Vladimir Solovyov aboard. Docked with Mir 3/15. Returned 7/16
Progress 25	1986 023A	USSR	Mar 19	Tyuratam	A-2	7,000	91.2	332	359	51.6	Resupplied Mir. Docked 3/21; undocked 4/20; reentered 4/21
Kosmos 1736	1986 024A	USSR	Mar 21	Tyuratam	F-1-m	5,000	104.4	922	1,010	65.0	Ocean surveillance; storage orbit
Kosmos 1737	1986 025A	USSR	Mar 25	Tyuratam	F-1-m		91.0	213	436	73.3	Ocean surveillance. Reentered 12/3
GSTAR 2	1986 026A	US	Mar 28	Kourou	Ariane 3	1,243	1,436.2	35,775	35,800	0.1	US commercial communications. Stationed above 105 deg. w long
Brasilsat 2	1986 026B	Brazil	Mar 28	Kourou	Ariane 3	1,140	1,436.2	35,781	35,796	0.0	Brazilian domestic communications. Located above 70 deg. w long
Kosmos 1738	1986 027A	USSR	Apr 4	Tyuratam	D-1-e	2,000	1,436.2	35,740	35,834	0.8	Communications. Placed above 346 deg. e long
Kosmos 1739	1986 028A	USSR	Apr 9	Tyuratam	A-2	6,000	89.5	173	329	64.8	Military photo recon. Reentered 6/7

Summary Log of Space Launches 1986

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1740	1986 029A	USSR	Apr 15	Plesetsk	A-2	6,000	92.2	352	413	72.9	Military photo recon. Recovered 4/28
Kosmos 1741	1986 030A	USSR	Apr 18	Plesetsk	C-1	700	100.7	779	808	74.0	Store/dump communications; replaced Kosmos 1503
Molniya 3-28	1986 031A	USSR	Apr 18	Plesetsk	A-2-e	1,800	717.6	491	39,855	63.4	Communications; replaced Molniya 3-23
None		US	Apr 18	WSMC	Titan 34D						Destroyed by launch vehicle explosion 16 seconds after launch
Progress 26	1986 032A	USSR	Apr 23	Tyuratam	A-2	7,000	91.3	338	344	51.6	Resupplied Mir; carried Salyut 7 cargo. Docked with Mir, 4/26. Undocked 6/22; reentered 6/23
GOES 7		US	May 3	ESMC	Delta						Destroyed by range safety after losing power seconds after launch
Kosmos 1742	1986 033A	USSR	May 14	Plesetsk	A-2	6,000	92.2	351	416	72.9	Military photo recon. Recovered 5/28
Kosmos 1743	1986 034A	USSR	May 15	Plesetsk	F-2	1,600	97.6	629	661	82.6	Elint. Replaced Kosmos 1626
Soyuz TM	1986 035A	USSR	May 21	Tyuratam	A-2	7,000	91.2	331	372	51.6	Test mission of new vehicle design. Docked with Mir, 5/23.Undocked, 5/29; returned, 5/30
Kosmos 1744	1986 036A	USSR	May 21	Plesetsk	A-2	6,000	90.4	218	371	62.8	Materials processing exps. Recovered 6/4
Kosmos 1745	1986 037A	USSR	May 23	Plesetsk	C-1	700	104.9	966	1,011	82.9	Navigation; replaced Kosmos 1627
Ekran 15	1986 038A	USSR	May 24	Tyuratam	D-1-e	2,000	1,434.4	35,532	35,976	0.4	Domestic communications; placed above 99 deg. e long
Meteor 2-14	1986 039A	USSR	May 27	Plesetsk	F-2	2,000	104.1	941	960	82.5	Meteorological
Kosmos 1746	1986 040A	USSR	May 28	Plesetsk	A-2	6,000	89.8	255	269	82.3	Earth resources photo recon. Recovered 6/12
Kosmos 1747	1986 041A	USSR	May 29	Tyuratam	A-2	600	89.1	248	252	70.4	Military photo recon. Recovered 6/12
INTELSAT V-14		ESA	May 30	Kourou	Ariane 2						Destroyed by range safety when 3rd stage failed to ignite
Kosmos 1748	1986 042A	USSR	Jun 6	Plesetsk	C-1	40	115.1	1,452	1,467	74.0	Tactical communications; 8-satellite launch
Kosmos 1749	1986 042B	USSR	Jun 6	Plesetsk	C-1	40	114.4	1,392	1,467	74.0	Tactical communications
Kosmos 1750	1986 042C	USSR	Jun 6	Plesetsk	C-1	40	114.6	1,406	1,468	74.0	Tactical communications
Kosmos 1751	1986 042D	USSR	Jun 6	Plesetsk	C-1	40	115.6	1,465	1,503	74.0	Tactical communications
Kosmos 1752	1986 042E	USSR	Jun 6	Plesetsk	C-1	40	115.4	1,466	1,485	74.0	Tactical communications

Summary Log of Space Launches 1986

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1753	1986 042F	USSR	Jun 6	Plesetsk	C-1	40	115.3	1,460	1,475	74.0	Tactical communications
Kosmos 1754	1986 042G	USSR	Jun 6	Plesetsk	C-1	40	114.9	1,436	1,468	74.0	Tactical communications
Kosmos 1755	1986 042H	USSR	Jun 6	Plesetsk	C-1	40	114.8	1,423	1,467	74.0	Tactical communications
Kosmos 1756	1985 043A	USSR	Jun 6	Tyuratam	A-2	6,000	89.4	169	323	64.9	Military photo recon. Reentered 8/4
Horizont 12	1986 044A	USSR	Jun 10	Tyuratam	D-1-e	2,000	1,436.1	35,759	35,814	0.8	Domestic communications; stationed above 345 deg. e long
Kosmos 1757	1986 045A	USSR	Jun 11	Plesetsk	A-2	6,000	90.0	165	384	82.3	Earth resources photo recon. Recovered 6/25
Kosmos 1758	1986 046A	USSR	Jun 12	Plesetsk	F-2	1,600	97.7	628	666	82.5	Elint. Replaced Kosmos 1666
Kosmos 1759	1986 047A	USSR	Jun 18	Plesetsk	C-1	700	104.8	967	1,000	82.9	Navigation; replaced Kosmos 1634
Kosmos 1760	1986 048A	USSR	Jun 19	Tyuratam	A-2	6,000	92.2	350	415	70.0	Military photo recon. Recovered 7/3
Molniya 3-29	1986 049A	USSR	Jun 19	Plesetsk	A-2-e	1,800	717.7	720	39,630	62.9	Communications; replaced Molniya 3-20
Kosmos 1761	1986 050A	USSR	Jul 5	Plesetsk	A-2-e	1,800	717.5	789	39,571	62.9	Early warning; maneuvered. Replaced Kosmos 1698
Kosmos 1762	1986 051A	USSR	Jul 10	Plesetsk	A-2	6,300	89.8	255	269	82.5	Earth resources photo recon. Recovered 7/24
Kosmos 1763	1986 052A	USSR	Jul 16	Plesetsk	C-1	700	100.4	754	803	74.0	Store/dump communications; replaced Kosmos 1741
Kosmos 1764	1986 053A	USSR	Jul 17	Tyuratam	A-2	7,000	89.5	170	327	64.9	Photo recon. Reentered 9/11
Kosmos 1765	1986 054A	USSR	Jul 24	Plesetsk	A-2	6,300	92.2	353	412	72.9	Photo recon. Recovered 8/7
Kosmos 1766	1986 055A	USSR	Jul 28	Plesetsk	F-2	1,600	97.7	631	662	82.5	Oceanographic
Kosmos 1767	1986 056A	USSR	Jul 30	Tyuratam	J-1		88.3	184	193	64.9	Decayed 8/16
Molniya 1-67	1986 057A	USSR	Jul 30	Plesetsk	A-2-e	1,800	717.7	555	39,792	63.0	Communications; replaced Molniya 1-59
Kosmos 1768	1986 058A	USSR	Aug 2	Plesetsk	A-2	6,000	89.8	255	269	82.6	Earth resources photo recon. Recovered 8/16
Kosmos 1769	1986 059A	USSR	Aug 4	Tyuratam	F-1-m	5,000	93.3	429	443	65.0	Ocean surveillance
Kosmos 1770	1986 060A	USSR	Aug 6	Tyuratam	A-2	7,000	89.7	238	281	64.7	Photo recon. Reentered 2/2/87
EGP	1986 061A	Japan	Aug 12	Tanegashima	H-1	685	115.7	1,479	1,497	50.0	Experimental Geophysical Payload. Test of new launch vehicle
JAS-1	1986 061B	Japan	Aug 12	Tanegashima	H-1	50	116.9	1,480	1,497	50.0	Japanese Amateur Satellite (radio relay)
Kosmos 1771	1986 062A	USSR	Aug 20	Tyuratam	F-1-m	5,000	104.2	910	1,001	65.0	Ocean surveillance; storage orbit
Kosmos 1772	1986 063A	USSR	Aug 21	Plesetsk	A-2	6,300	89.4	356	415	72.9	Photo recon. Recovered 9/3

Summary Log of Space Launches 1986

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1773	1986 064A	USSR	Aug 27	Tyuratam	A-2	7,000	89.7	173	343	64.9	Photo recon. Reentered 10/21
Kosmos 1774	1986 065A	USSR	Aug 28	Plesetsk	A-2-e	1,800	717.5	677	39,664	63.4	Early warning; replaced Kosmos 1547
Kosmos 1775	1986 066A	USSR	Sep 3	Tyuratam	A-2	6,300	92.1	348	414	70.4	Photo recon. Recovered 9/17
Kosmos 1776	1986 067A	USSR	Sep 3	Plesetsk	C-1	700	94.5	471	513	74.0	Minor military
Molniya 1-68	1986 068A	USSR	Sep 5	Plesetsk	A-2-e	1,800	717.7	584	39,767	63.1	Communications; replaced Molniya 1-57
None	1986 069A	US	Sep 5	ESMC	Delta		93.9	212	719	39.1	Decayed 9/28
None	1986 069B	US	Sep 5	ESMC	Delta		92.9	223	611	22.8	Decayed 11/25
Kosmos 1777	1986 070A	USSR	Sep 10	Plesetsk	C-1	700	100.7	774	809	74.0	Communications; replaced Kosmos 1624
Kosmos 1778	1986 071A	USSR	Sep 16	Tyuratam	D-1-e		675.7	19,131	19,139	64.8	Navigation; Glonass system
Kosmos 1779	1986 071B	USSR	Sep 16	Tyuratam	D-1-e		675.7	19,123	19,138	64.8	Navigation; Glonass system
Kosmos 1780	1986 071C	USSR	Sep 16	Tyuratam	D-1-e		675.7	19,105	19,153	64.8	Navigation; Glonass system
Kosmos 1781	1986 072A	USSR	Sep 17	Tyuratam	A-2	6,000	92.2	345	416	70.4	Photo recon. Recovered 10/1
NOAA 10	1986 073A	US	Sep 17	WSMR	Atlas E	1,700	101.2	808	826	98.7	Meteorological
Kosmos 1782	1986 074A	USSR	Sep 30	Plesetsk	F-2	1,400	97.7	636	664	82.5	Elint
Kosmos 1783	1986 075A	USSR	Oct 3	Plesetsk	A-2-e	1,800	358.1	639	20,009	62.8	Launch vehicle malfunction, failed to achieve operable orbit
PRC 19	1986 076A	PRC	Oct 6	Shuang Cheng Tse	Long March 2		90.0	172	375	56.9	Earth resources, film capsule recovered 10/11
Kosmos 1784	1986 077A	USSR	Oct 6	Tyuratam	A-2	7,000	89.2	207	265	64.8	Photo recon. Reentered 11/11
Kosmos 1785	1986 078A	USSR	Oct 15	Plesetsk	A-2-e	1,800	717.5	687	39,663	63.1	Early warning; replaced Kosmos 1596
Molniya 3-30	1986 079A	USSR	Oct 20	Plesetsk	A-2-e	1,800	717.8	584	38,722	62.8	Communications; replaced Molniya 3-21
Kosmos 1786	1986 080A	USSR	Oct 22	Tyuratam	J-1		112.0	189	2,563	64.9	
Kosmos 1787	1986 081A	USSR	Oct 22	Tyuratam	A-2	6,300	89.6	230	281	70.0	Photo recon. Recovered 11/4
Raduga 19	1986 082A	USSR	Oct 25	Tyuratam	D-1-e	2,000	1,436.5	36,765	36,822	1.1	Communications. Placed above 45 deg. e long
Kosmos 1788	1986 083A	USSR	Oct 27	Plesetsk	C-1	700	94.4	460	514	65.8	Minor military

Summary Log of Space Launches 1986

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1789	1986 084A	USSR	Oct 31	Plesetsk	A-2	6,300	91.1	318	338	82.6	Earth resources photo recon. Recovered 11/14
Kosmos 1790	1986 085A	USSR	Nov 4	Plesetsk	A-2	6,300	89.5	224	279	72.9	Photo recon. Recovered 11/18
Kosmos 1791	1986 086A	USSR	Nov 13	Plesetsk	C-1	700	104.7	951	1,010	82.9	Navigation; replaced Kosmos 1553
Kosmos 1792	1986 087A	USSR	Nov 13	Tyuratam	A-2	7,000	89.3	167	312	64.9	Photo recon. Reentered 1/5/87
Polar Bear	1986 088A	US	Nov 14	WSMC	Scout	125	104.9	960	1,015	89.6	Polar Beacon Experiments and Research Satellite
Molniya 1-69	1986 089A	USSR	Nov 15	Plesetsk	A-2-e	1,800	717.1	496	39,852	62.9	Communications; replaced Molniya 1-60
Horizont 13	1986 090A	USSR	Nov 18	Tyuratam	D-1-e	2,000	1,437.9	35,786	35,858	1.4	Communications; located above 90 deg. e long
Kosmos 1793	1986 091A	USSR	Nov 20	Plesetsk	A-2-e	1,800	717.6	594	39,755	62.9	Early warning; replaced Kosmos 1687
Kosmos 1794	1986 092A	USSR	Nov 21	Plesetsk	C-1	40	115.6	1,467	1,501	74.0	Communications. 8 satellite launch
Kosmos 1795	1986 092B	USSR	Nov 21	Plesetsk	C-1	40	115.4	1,467	1,482	74.0	Communications
Kosmos 1796	1986 092C	USSR	Nov 21	Plesetsk	C-1	40	115.2	1,455	1,479	74.0	Communications
Kosmos 1797	1986 092D	USSR	Nov 21	Plesetsk	C-1	40	115.0	1,445	1,472	74.0	Communicaitons
Kosmos 1798	1986 092E	USSR	Nov 21	Plesetsk	C-1	40	114.9	1,429	1,473	74.0	Communications
Kosmos 1799	1986 092F	USSR	Nov 21	Plesetsk	C-1	40	114.7	1,415	1,472	74.0	Communications
Kosmos 1800	1986 092G	USSR	Nov 21	Plesetsk	C-1	40	114.5	1,399	1,473	74.0	Communications
Kosmos 1801	1986 092H	USSR	Nov 21	Plesetsk	C-1	40	114.4	1,386	1,471	74.0	Communications
Kosmos 1802	1986 093A	USSR	Nov 24	Plesetsk	C-1	700	104.9	963	1,025	82.9	Navigation; replaced Kosmos 1605
Kosmos 1803	1986 094A	USSR	Dec 2	Plesetsk	F-2	700	115.9	1,495	1,499	82.6	Geodetic
Kosmos 1804	1986 095A	USSR	Dec 4	Tyuratam	A-2	6,300	92.1	345	412	70.0	Photo recon. Recovered 12/18
FltSatCom 7	1986 096A	US	Dec 5	ESMC	Atlas Centaur	2,310	1,426.3	35,326	35,960	5.3	Military communications
Kosmos 1805	1986 097A	USSR	Dec 10	Plesetsk	F-2	1,400	97.7	635	661	82.5	Elint? May be new spacecraft
Kosmos 1806	1986 098A	USSR	Dec 12	Plesetsk	A-2-e	1,800	717.6	618	39,727	62.9	Early warning; replaced Kosmos 1729
Kosmos 1807	1986 099A	USSR	Dec 16	Plesetsk	A-2	6,700	89.5	164	336	67.1	Photo recon. Reentered 2/23/87
Kosmos 1808	1986 100A	USSR	Dec 17	Plesetsk	C-1	700	105.0	973	1,020	82.9	Navigation; replaced Kosmos 1704/1598

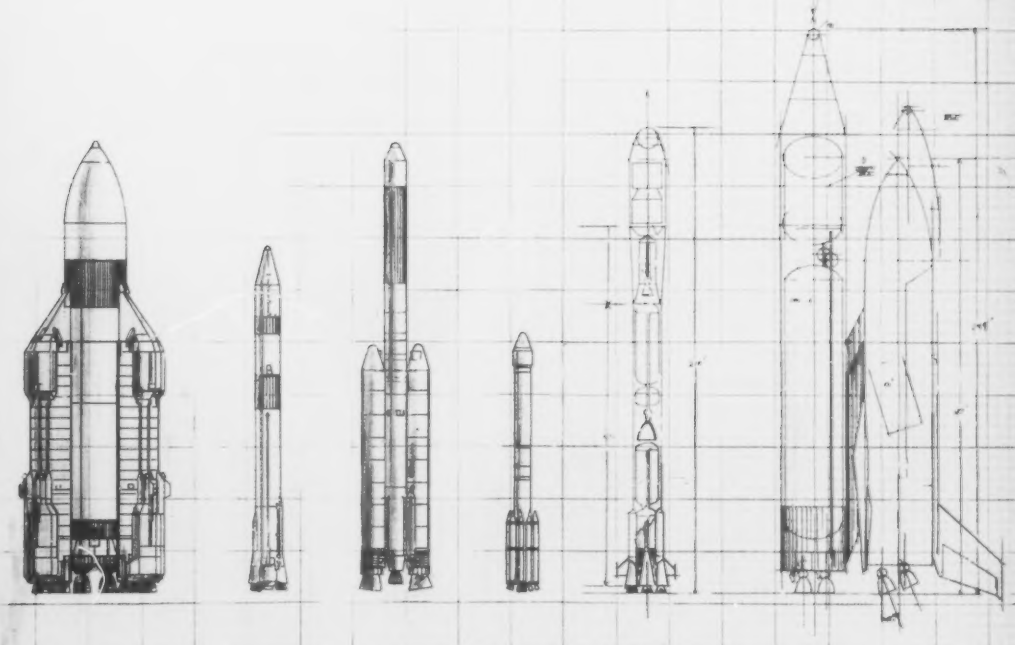
Summary Log of Space Launches 1986

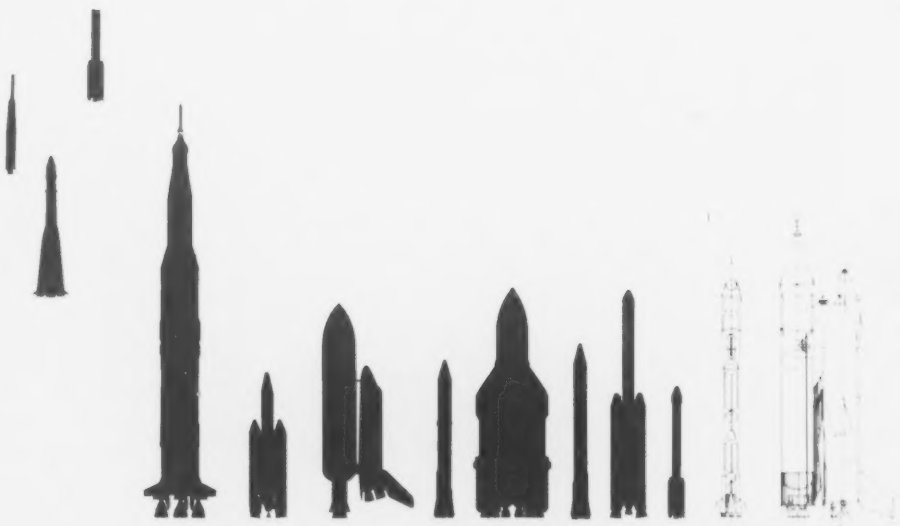
Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1810	1986 102A	USSR	Dec 26	Tyuratam	A-2		89.6	245	263	64.8	Photo recon.
Molniya 1-70	1986 103A	USSR	Dec 26	Plesetsk	A-2-e	1,800	701.0	450	39,074	62.8	Communications; replaced Molniya 1-62

Notes

Space Log

1957 - 1987





Front cover from left to rilght—Thor-Able, A-1, Delta, Saturn V, Titan IIIC, Space Shuttle, Atlas Centaur, Energiya, Atlas MLV II, Titan IV, Delta II, Ariane 5, and Advanced Launch System concept.

Cover Illustration by Phil Weisgerber

Space Log Volume 23

1957–1987

TRW Space Log is published by the Space & Technology Group of TRW's Space and Defense Sector. Information is drawn from data released by the National Aeronautics and Space Administration, Department of Defense, Library of Congress, United Nations, British Royal Aircraft Establishment, TASS, Teledyne Brown Engineering's "The Soviet Year in Space 1987," and other official sources. Where facts and other data appear in conflict, NASA records are cited. While diligent efforts are made to ensure accuracy, comments and corrections of fact are invited. TRW Space Log is unofficial and not published under government contract. Professional personnel in the aerospace industry, the military and other government agencies may request Space Log by writing (on company or organization letterhead): Editor, TRW Space Log, TRW Space & Technology Group, One Space Park, Mail Station 135/1744, Redondo Beach, CA 90278. Please include your internal mail location.

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Introduction

We have just marked the 30th anniversary of America's first space launch. Later this year we will observe the 30th anniversary of NASA's existence.

These milestones come at a crossroads time. We are emerging from a time of space recession occasioned by the tragic Challenger accident of 1986. We have suffered a loss of the perception, if not the reality, of world space leadership. The events of the next decade will determine to a significant degree whether we will start the 21st century as an also-ran or as the acknowledged king-of-the-hill.

It is important that we win the leader role. The goal of world space leadership is more that an abstract aim intended to enhance a nation's prestige among the international community. It is a symbol of a superior scientific and technological capability, not just in space but in many other areas of productive endeavor. Space leadership brings corollary advantage in such fields of national importance as defense, international competitiveness and the elevated standard of living that accrues from advancing science technology. The quest for space leadership, therefore, is a practical investment in our nation's future.

How do we go about accomplishing the goal?

First, we must rebuild the space shuttle capability to target launch frequency, and we must back the shuttle with a complementary fleet of expendable launch vehicles.

We must demonstrate leadership in the highly visible U.S./International Space Station program by continuing development on a consistently funded basis that will permit deployment and operation of the station on the planned schedule.

We must provide the support essential to development of a strong competitive U.S. commercial space industry, including both launch and orbital activity segments.

We must make space more affordable by effecting major cost reductions. The goal of lowering the cost of delivering a pound of payload to orbit at one-tenth the current cost seems attainable. We must additionally seek economies in manufacturing costs and in outlays for mission planning and processing.

We must strengthen the foundation for the giant-step programs contemplated for the 21st century, through emphasis on replenishing and broadening the national store of basic space technology and lunar/interplanetary preliminary technology.

These steps are technically within our grasp. Despite the long and frustrating hiatus in space operations, we have not lost our technological capability; we have only temporarily lost our ability to demonstrate it.

Given the full support of the American people, I am confident that we can once again establish space preeminence and harvest the national benefits of space leadership.

Don Fuqua
President
Aerospace Industries Association

Don Fuqua is President and General Manager of the Aerospace Industries Association of America, Inc. (AIA). Before joining AIA, Mr. Fuqua served 12 terms as a U.S. Congressman, representing Florida's Second Congressional District. He gained firsthand knowledge of the U.S. space program as a member of the subcommittee overseeing the program in its formative years, and as Chairman of the Subcommittee on Space Science and Applications from 1971 to 1981.

Spacecraft Details 1987

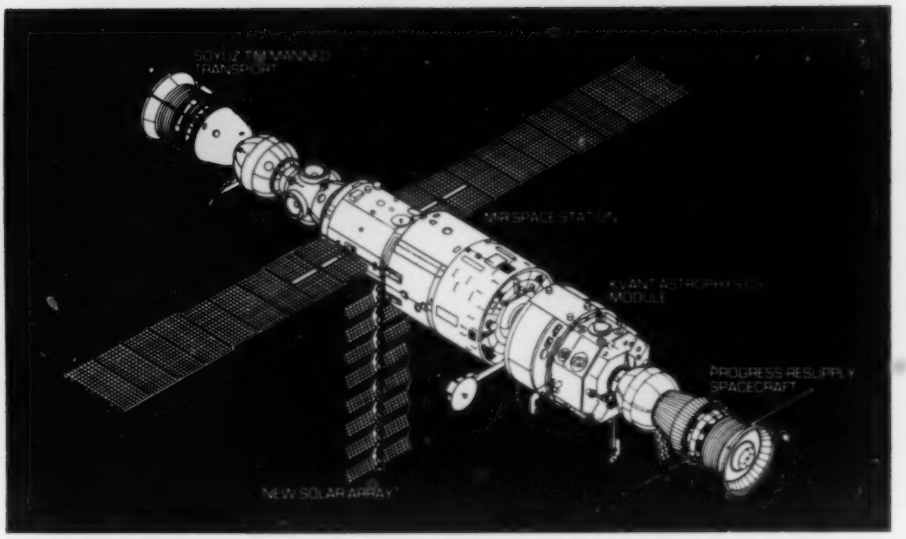
Includes most major launches. Spacecraft/launch data are listed chronologically. All times listed are Universal (Zulu, GMT) unless otherwise indicated. For additional details, refer to 1987 Summary Log of Space Launches.

Astro C

Japan's X-ray observation satellite, Astro C (also called Ginga), was launched aboard an Mu-3SII, 06:30, February 5 from Kagoshima Space Center. The 420-kg satellite is rectangular, measuring 1.5 m high and 1 m wide. Sponsored by Japan's Institute of Space and Astronautical Science (ISAS), Astro C carries a low energy X-ray telescope built by the University of Leicester, England, and a gamma ray detector developed by Los Alamos National Research Laboratory, New Mexico. The X-ray detector covers one side of the satellite and is the largest ever pointed in a single direction. Its target area is rich in X-ray sources, particularly far off galaxies surrounding black holes hundreds of times bigger than the sun. The satellite is expected to gather X-ray and gamma ray data for four years.

Mir

The Soviets established a continuous manned presence in orbit in 1987, beginning with the arrival of cosmonauts Yuri Romanenko and Alexander Laveikin to the Mir space station, February 7. The pair flew aboard the new Soyuz TM-2, designed to hook up with Mir's multiport docking system without the station having to change position. Soyuz TM makes all docking corrections while Mir remains on course. Launched from Tyuratam at 21:38, February 5, Soyuz TM-2 docked with Mir's forward port at 23:19 two days later. Romanenko and Laveikin completed initial station activation, February 11. Mir had been unoccupied since July 1986, but Progress 27 had docked January 18 with supplies for the first weeks of the mission. During the next ten months, Mir was resupplied by six Progress missions. Progress 28 on March 5; Progress 29, April 11; Progress 30, May 21; Progress 31, August 5; Progress 23, September 26; Progress 33, November 23. With Progress docked to the orbiting complex — Mir, Soyuz, the new Kvant facility — the station grew to 34.4 m long.



MIR Space Station Complex *drawing by Daniel James Gauthier*

The Kvant astrophysics module, carrying X-ray experiments from West Germany, the Netherlands, Britain and ESA, arrived April 5. The 5.8-m long, 4.1-m wide, 20-ton science facility is expected to remain in space one to two years. The initial docking attempt failed due to unspecified problems in the control system. A second docking attempt on April 9 went awry when electrical connections between Kvant and Mir could not be completed. During an unscheduled 3-hr, 40-mn EVA, Romanenko and Laveikin found a small object interfering with the link up. The cosmonauts manually separated the two modules and removed what was later described as a small white bag. Ground controllers completed the docking maneuver. Once docked, Kvant's 10.6-ton service pod was jettisoned. Kvant has since been observing celestial high energy sources, specifically a newly discovered supernova in the Large Magellanic Cloud.

Two planned EVA's to install a 29.8-m solar array were postponed due to the unscheduled Kvant EVA. On June 12, the cosmonauts spent 1 hr, 53 mns installing the solar battery panel and a lattice mast structure to Mir's exterior. On June 16, they connected the battery to Mir's electrical system and unfurled the solar panels. EVA time was 3 hrs, 15 mns.

The first of two visiting crews lifted off from Tyuratam at 01:59, July 22; docking two days later. Soyuz TM-3 carried Alexander Alexandrov, Alexander Viktorenko and Syrian cosmonaut Mohammed Faris. Because doctors monitoring the cosmonauts were unhappy with Alexander Laveikin's heart rate, he returned to earth with the visitors, July 29. The return craft, TM-2, landed at 01:04, July 30. Alexandrov remained on Mir with Romanenko. Laveikin, who had spent 23 weeks in orbit, was later declared in good health.

The year's final visitors were the replacement crew — Vladimir Titov, Musakhi Manarova — and test pilot Anatoly Levchenko. Launched December 21, they arrived at Mir aboard Soyuz TM-4 at 12:50, December 23. After a seven-day visit, veteran cosmonauts Romanenko and Alexandrov joined Levchenko for the return flight aboard Soyuz TM-3. The trio undocked from Mir at 05:55, December 29 and landed in the Soviet Union at 09:16. Yuri Romanenko had spent 326 days, 11 hrs, 38 mns in space, breaking the previous endurance record of 236 days, 22 hrs, 50 mns set by Vladimir Solovyov and Oleg Atkov in 1984.

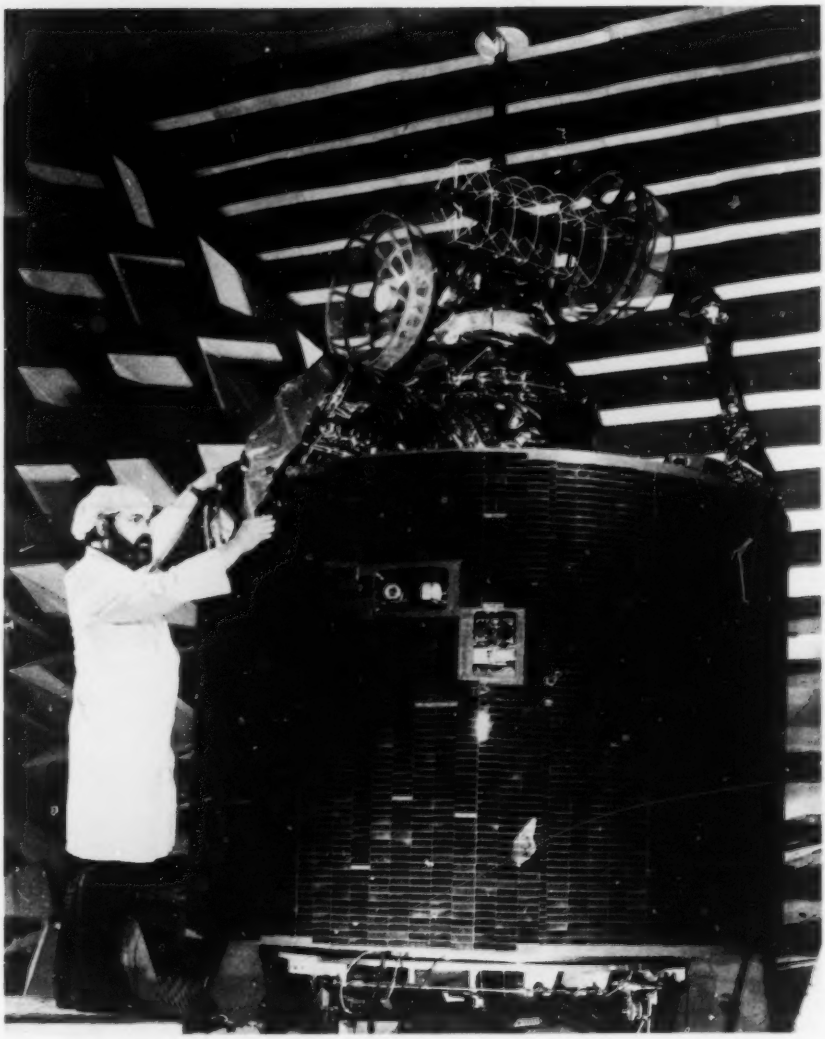
Alexander Alexandrov had logged 160 days, 7 hrs, 17 mns in orbit. Both were fatigued but in good health, with Romanenko reportedly walking unaided on his second day back under the influence of gravity. Manarov and Titov are scheduled to remain aboard Mir for one year. The Soviet long-term missions may be in preparation for a 30-month manned excursion to Mars.

MOS-1

Japan's first earth observation orbiter, the Marine Observation Satellite, was launched aboard an N-II from Tanegashima Space Center, 01:20, February 18. It was dubbed MOMO-1 (peach blossom) following its successful launch into sun-synchronous orbit. MOS-1 is experimental, designed to establish basic technologies for earth observation satellites, i.e sensors, data collection, and to evaluate techniques for placing, tracking and controlling satellites in sun-synchronous orbit. Developed by NASDA and Nippon Electric, MOMO-1 weighs 745 kg, and measures 1.3 by 1.4 by 2.4 m. A multi-spectral electronic self-scanning radiometer provides sea surface color data in four bands. Resolution is 50 m. A visible and thermal infrared radiometer supplies sea surface temperature data, with 900 m resolution in the visible and 2,700 m in thermal infrared. A microwave scanning radiometer, determining atmospheric water content, has 32 km resolution, improving to 23 km at 31.9 GHz. MOS-1 data is available to international users under separate agreements. Design life is two years; a second MOS is scheduled for launch by decade's end.

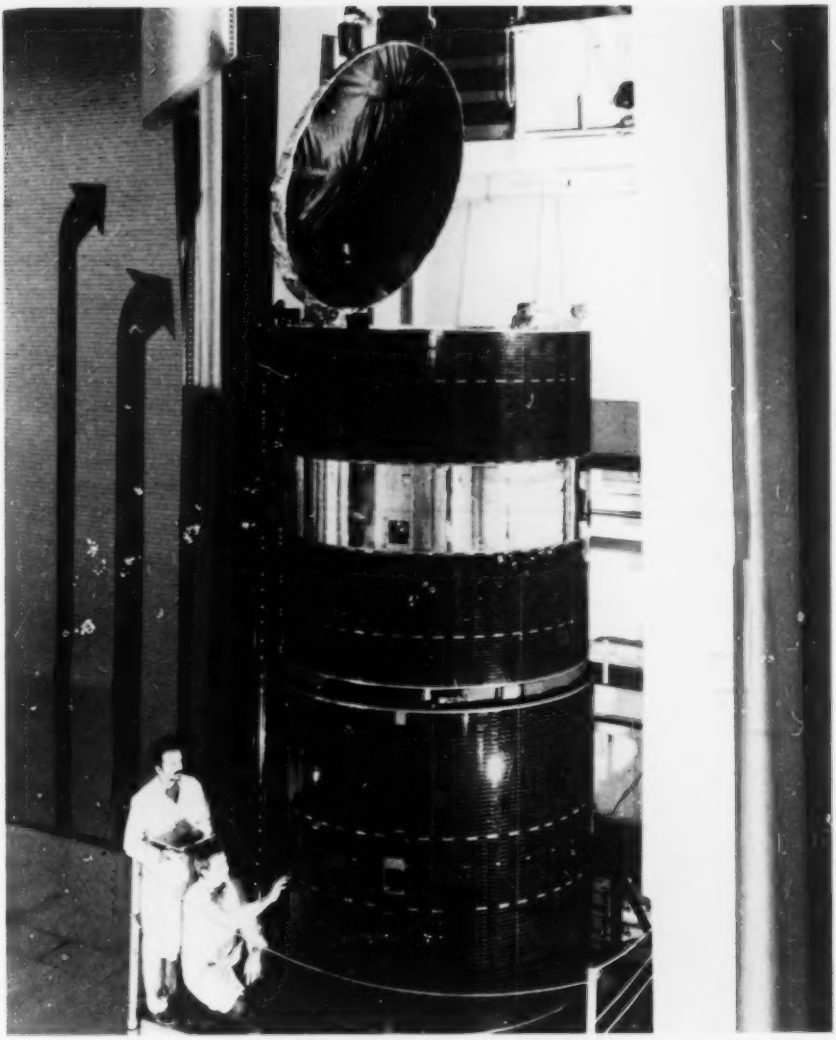
GOES 7

The Geostationary Operational Environmental Satellite (GOES 7) joins GOES 6 to complete an orbiting network providing weather pattern images from the east Atlantic to the mid-Pacific. These images, the same seen on TV weather reports, provide storm warnings and temperature data. The 1984 failure of GOES 5 and the 1986 launch failure of GOES G, left GOES 6 the only operational U.S. weather satellite. GOES 7, Delta-launched at 6:05 p.m. (E.S.T.), February 26, from Cape Canaveral, eliminates the need to move



GOES 7

GOES 6 to cover east and west storm seasons. GOES 7, built by Hughes Aircraft Company, is 2 15 m in diameter, stands 3.53 m tall and weighs 399 kg on orbit. Body mounted solar arrays provide 330 W of power. In addition to the visible and infrared imaging system which scans one third of the earth every 18 minutes, GOES 7 carries a receiver to detect emergency radio signals. It is the first geosynchronous weather satellite in SARSAT, the international satellite search and rescue service. Shortly after launch, heating problems in the apogee kick motor (AKM) spurred flight engineers to boost GOES 7 into geosynch earlier than planned; it was feared that the AKM would overheat and be unable to perform. GOES 7 is stationed above 74 w long.; GOES 6 above 135 w long. The system is operated by the National Oceanic and Atmospheric Administration (NOAA).



Palaba B2P

Palapa B2P

Linking Indonesia's 13,677 islands with 24-hour telephone, television, facsimile and data service, Palapa B2P was Delta-launched 22:12, March 20 from Cape Canaveral. Palapa B2P, stationed above 113 w long., joins Palapa B1 in orbit. It replaces Palapa B2, cast into an incorrect orbit in 1984 and retrieved later that year. The satellite weighs 652 kg at the beginning of its eight-year life. It is 2.16 m in diameter and, with 1.8-m antenna erected and outer solar panel deployed in orbit, measures 6.9 m, more than doubling the height and power output of its predecessors. Solar panels

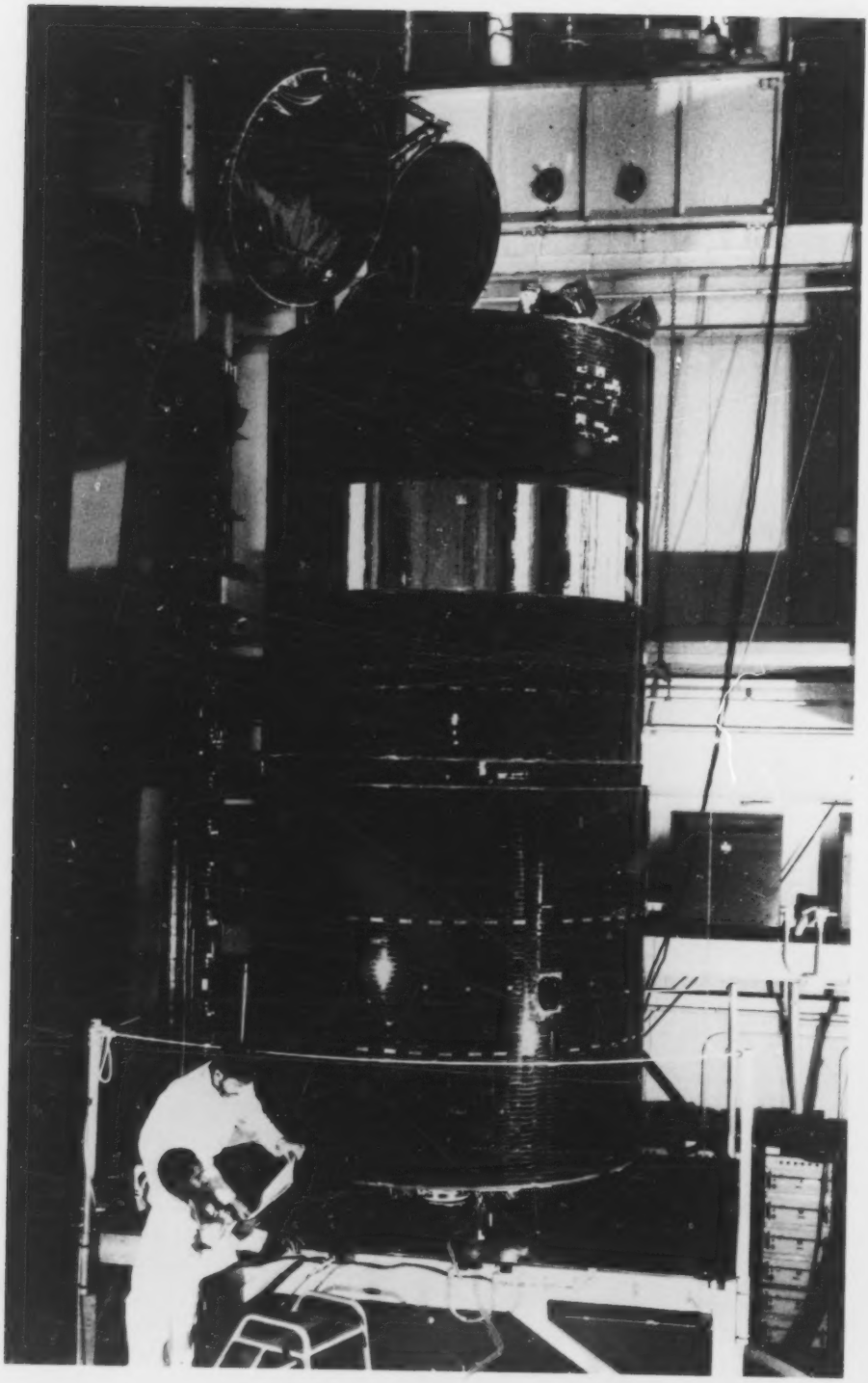
provide 1,062 W of power. Twenty-four transponders carry 24,000 one-way voice circuits or 24 color TV transmissions simultaneously. Palapa B2P operates in C band, receiving from 5.9/6.4 GHz and transmitting from 3.7/4.2 GHz. Built by Hughes Aircraft Company for PERUMTEL, Indonesia's state-owned telecommunications company, the satellite also serves the Association of Southeast Asian Nations, including the Philippines, Thailand, Malaysia, Singapore and Papua New Guinea.

DMSP

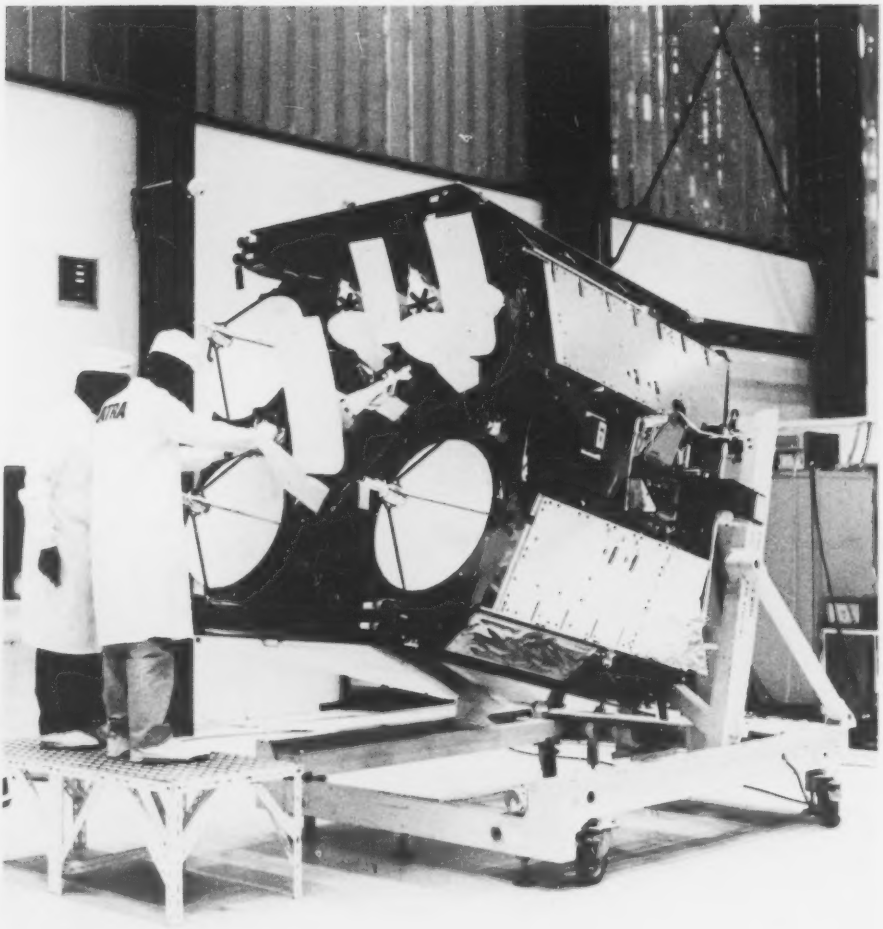
The third in a series of advanced Air Force DMSP Block 5D-2 meteorological satellites was launched into a sun-synchronous polar orbit at 02:38, June 20 from Vandenberg AFB by an Atlas E launch vehicle. Through the DMSP constellation, military weather forecasters can detect and observe developing weather patterns and track existing weather systems over remote areas and oceans. Data gathered by the satellites is also available to civilians through the National Oceanic and Atmospheric Administration. Built by GE/RCA, DMSP Block 5D-2 measures 4.3 m tall and 1.5 m in diameter. It weighs approximately 750 kg at launch. This satellite (Flight 8) carries an imaging sensor that can see into and through clouds, giving forecasters a first-time view of a storm's intensity. DSMP F8 replaces F6 and has a four-year design life.

ETS-5

Japan's Engineering Test Satellite (ETS-5) demonstrates Japan's capability with three-axis stabilized satellites in geosynchronous orbit. The satellite, built by Mitsubishi Electric Corp., required domestic technological advances in lightweight spacecraft structures, and thermal and control systems. ETS-5, renamed Kiku once aloft, was launched 09:20, August 27, aboard a three-stage H-1 from Tanegashima Space Center. It was the second launch for the H-1, the first for the Nissan-developed third stage solid motor. ETS-5 weighs 550 kg and measures 1.4 x 1.67 x 1.74 m. Solar arrays span 9.7 m tip to tip. The test satellite, boosted to geosynchronous orbit, August 30, also demonstrates new Japanese data system and solar array technology as well as aircraft communications relay, navigation and search and rescue capability for locating ships in distress. ETS-5 is stationed above 150 deg. e long.



Aussat 3



ECS 4

ECS-4

The ECS-4 telecommunications satellite was dual-launched aboard an Ariane 3 at 00:45, September 16. Operated by the European Telecommunications Satellite Organization (Eutelsat), it was designated Eutelsat 1-F4 on orbit. The satellite transmits TV programming to member countries of Eutelsat and the European Broadcasting Union. It also provides telephone, data, facsimile and telex service. The three-axis stabilized ECS-4 measures 2 m on each side, spans 14 m across its solar arrays and weighed 1,175 kg at launch. On-orbit mass is 700 kg. Fourteen 20-W transponders operate at 14/11 GHz. ECS-4 was built by a consortium of 36 European aerospace firms led by British Aerospace. It began service November 1, stationed above 10 deg. e long, and has a seven-year life expectancy.

Aussat 3

Expanding Australian satellite communications to the South Pacific, Aussat 3 was launched from Kourou, French Guiana, aboard an Ariane 3, at 00:45, September 16. Aussat 3 joins Aussat 1 and 2, providing TV, radio, telephone and facsimile service to residents throughout Australia's three million square miles. A three-dish antenna system provides national beam coverage as well as four spot beams for specialized coverage. Spot beams allow high quality TV pictures to be received by ground antennas as small as 1.2 m. Additional feed horns provide switched beam coverage to New Zealand and most South Pacific islands. Built by Hughes Space and Communications Group for Aussat Pty, Ltd, the spin-stabilized satellite is 2.2 m in diameter, measures 6.6 m fully deployed and weighed 1,195 kg at launch. The payload consists of four 30-W transponders, 11 12-W transponders, and operates in 14/12 GHz band. The final first-generation Aussat resides in geostationary orbit above 164 deg. e long.

TVSat 1

West Germany's high-power, direct broadcast satellite, TVSat 1, was launched aboard an Ariane 2 at 02:19, November 21. Developed by the Eurosatellite European consortium, TVSat 1 was designed to transmit digital television and radio programming receivable on 60-cm antennas in Germany and 90-cm antennas in secondary coverage areas in Western Europe. Three-axis stabilized, TVSat 1 is 6.4 m tall, 19.2 m wide with 3-kW solar arrays deployed, and weighed 2,077 kg at launch. The satellite has a transmitting power of 65.5 to 65.7 dBW over five channels and operates in 11/12 and 17/18 GHz. Twenty-five minutes after launch the solar arrays were commanded to partially extend to charge the batteries. One solar panel stuck when the hold down hooks failed to release it. Attempts to free the panel by spinning the satellite failed. The open antenna supplied enough power for a few years of service, but the recalcitrant panel blocked deployment of the receiving antenna. TVSat 1 was written off commercially, but will be used for system tests.

The Advanced Launch System: A Status Report

by Col. John Wormington
ALS Program Director
Air Force Space Division

The Advanced Launch System (ALS), a joint DoD/NASA development effort now under way, is mandated to give the nation a reliable, resilient launch capability at one tenth the cost of present-day Titan IV launches, a reduction from $3,000 per pound to $300/lb to low-earth orbit (LEO). To meet these goals we are addressing changes across the board, from launch pad facilities, personnel and training, manufacturing, tracking facilities, assembly and checkout to payload interfaces. Of course, the cornerstone of any new launch system is the vehicle itself, but ALS is more than a new launch vehicle, it is a revolutionary approach to overall launch operations.

The ALS is targeted to meet DoD, NASA, civil and scientific user needs for the late 1990s and beyond. It is specifically required to provide primary launch capability for all payloads that exceed the capability of the Titan IV and shuttle, provide backup launch capability for specified DoD payloads currently assigned to Titan, and support SDI space-based deployment requirements, the space station and future expanded civil missions. These launches must be conducted under safe, secure and environmentally acceptable conditions. Again, at a congressionally mandated cost of $300 per pound.

These requirements lead to a range of possible launch rates of 10 to 50 launches per year for a large — 15,000-lb-class to LEO vehicle. ALS is not, however, about launching heavy payloads. We can do that. The shuttle puts 250,000 pounds into low-earth orbit — 20,000 pounds is the orbiter. The challenge is to do it for $300/lb. Cost performance is launch rate dependent. Our analysis shows a reasonable expectation of meeting the $300/lb goal at a rate of 25 launches per year. This cost goal is recurring cost only and does not include amortization of the investment. It does include a pro-rata share of the replacement cost of any reusable hardware that had a limited lifetime.

90 Percent Availability

The requirement for reliable, resilient operations reflects the desire to limit launch failures to the maximum extent practicable and to return to operational status as soon as possible after a failure. There is no such thing as an immortal launch vehicle; failures will occur. But failures can be limited by a reliable system; the cost of failure mitigated by backup capability. The ALS will be in available status, opposed to standdown status, 90 percent of

the time. It has a targeted surge capacity — stepped up operations to make up for failure — that will survive two successive failures with no negative schedule impact.

The ALS development schedule is four-phased, with launch vehicle production commencing in early 1996. Currently in the concept definition phase, the ALS vehicle may turn out quite different than anything yet developed. In the past, we have been concerned with reducing weight. Today, weight is not the issue. The issue is low cost, bulk transportation. Today, bigger might be the better way to meet U.S. launch requirements.

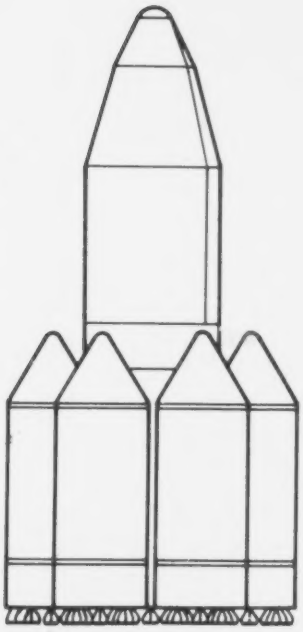
Seven contractors participating in Phase I have identified a one-and-one-half-stage rocket as the preferred configuration. A core stage carries the payload to LEO. A booster stage is discarded early in the trajectory. All contractors have identified the core as a liquid hydrogen/liquid oxygen powered system. There is no consensus on the booster configuration. Booster alternatives include strap-on solids, strap-on pump-fed or pressure-fed liquids; strap-on hybrids and various kinds of reusable boosters. Most contractors are considering some form of reusability — recover and reuse the core engine and avionics and/or recover and reuse the booster. There is no firm conclusion that reusability is beneficial or warranted.

Expendable vs. Reusable

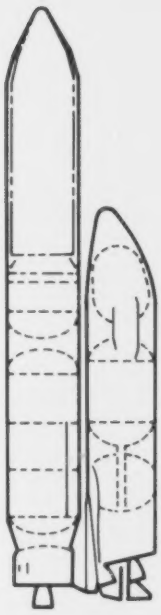
The high launch rates, up to 50 per year, and the low cost per pound combine to place significant constraints on the ALS concept. Most contractors are considering reusability solely for its cost benefits. One of the major drivers for reusability is the nonavailability of low cost expendable equipment — particularly a low cost expendable liquid hydrogen/liquid oxygen engine for the core. A major effort is under way to define and develop such an engine. It is, in fact, the main technical challenge of the ALS program. The alternative — using high cost engines — forces us to consider engine recovery.

Ground and flight operations are necessarily constrained, streamlined and standardized. Payload unique operations are to be avoided as they add both processing time and manpower. The philosophy is to limit the launch vehicle to transportation only, i.e. a truck. The closer we get to "Federal Express," the better job we're going to do. The real-world ability to maintain such an austere interface is the subject of continuing study with the payload community.

Reliability and resiliency are the subject of continuing analysis. The contractors have reached general consensus that simple robust systems with large design margins are inherently more reliable than complex systems with reduced margins for increased performance. Ample margins are also proving to be a necessary ingredient to low cost systems — allowing for lower cost materials and processes, i.e., spending weight to save money. A continuing trade is the relative benefit of redundancy, for example, an additional engine to allow engine-out performance. Redundant equipment may increase reliability at the expense of unnecessary extras.



A partially reusable ALS vehicle uses 32 uprated RL-10 engines to fire strap-on boosters and a core booster. Initial lift capability is 90,000 to 250,000 pounds, with growth to 550,000 pounds, depending on the number of strap-ons used. (Hughes Aircraft Company)

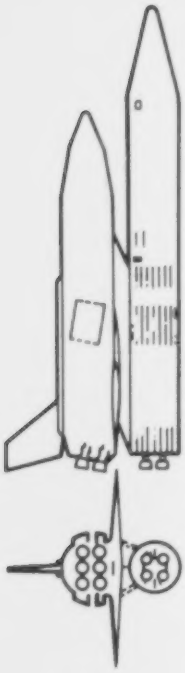


A large liquid hydrogen/liquid oxygen core with an expendable LOx/LH2 flyback booster. The expandable stage can be converted to a two-stage vehicle, one of which would be recoverable. Lift capacity is 150,000 to 200,000 pounds. (Boeing)

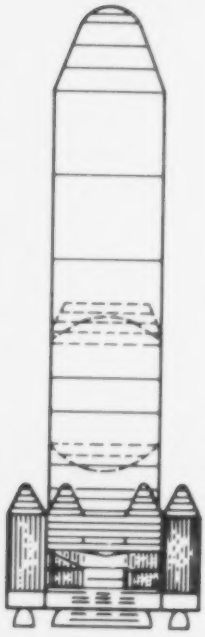
Innovative Solutions

Concurrent with system concept definition, the contractors are preparing technology development and demonstration plans detailing development required to implement their ALS concepts, and the demonstrations necessary to show their mastery of the technology. Industrial preparedness plans identify shortfalls in capability needed to produce their concepts; system models allow parametric investigation of their concepts. In Phase I, the Air Force/NASA is not attempting to direct a specific solution. We are leaving all options open, seeking innovative, creative solutions. In August 1988, two contractors will be selected for Phase 2 concept demonstration and validation.

Phase 2 will continue for 25 months, with the preliminary design review scheduled for July 1990. Phase 3, full scale development, will begin the first quarter of 1991 and continue through Initial Operational Capability



A flyback booster burning liquid hydrogen/liquid oxygen and a core engine burning solids can lift 162,000 pounds. Same core engine can be used with strap-ons instead of flyback. (General Dynamics)



Fully expendable, this ALS configuration uses multiple "clean" SRMs and a liquid hydrogen/liquid oxygen J-2S core engine. Payload capacity is 138,000 pounds. (Rockwell International)

(IOC) in 1998. The Low Rate Initial Production (LRIP) decision will start Phase 4 upon the successful completion of initial operational testing. In addition to vehicle procurement activity required to meet launch needs, Phase 4 will include construction of sufficient additional facilities and launch sites to support the launch rates and orbit placement requirements of the payload community. First launch is planned for late 1996.

Joint DoD/NASA Management

The ALS is jointly managed by DoD/NASA with overall program management responsibility residing in the Advanced Launch System Joint Program Office (JPO) at Air Force Space Division, Los Angeles AFB, CA. The JPO is headed by a program manager appointed by the Air Force, with a NASA-appointed deputy program manager and joint staffing. The JPO is responsible

for system cost, schedule and performance. DoD acquisition regulations will provide the basis for this effort, with NASA participating as a full member of the acquisition board. The Air Force will assume the lead for system engineering and integration, payload module and logistics. NASA will lead liquid engine systems and focused technology efforts. Other assignments — solid rocket motors, flyback boosters — will be determined as necessary, depending on their applicability to the vehicle concept chosen for Phase 2.

Congress has appropriated $150 million for FY 88, with $70 million transferred to NASA for ALS-related propulsion activities. All ALS variants must be directed toward the mandated one tenth of current launch cost goals. No funds are available to facilitate early SDI deployment. Of the total $225 million funded ($75 million in FY 87), $175 million is committed to new technology. The DoD and NASA are sharing the costs of development in such critical areas as propulsion, avionics, structures, aerothermodynamics, and manufacturing. Each new technology is being pursued with an eye to synergistic applications to other expendable launch vehicles and STS.

The Advanced Launch System goals are so ambitious that it is going to take a revolution in the space transportation business to accomplish them. We are looking at all aspects of space transportation from simple, standard payload interfaces to whole new operations concepts to ensure that every potential way to reduce costs is brought to light, examined and traded off. The approach starts with a clean sheet of paper and the goal of truly revolutionizing space transportation. It is a national opportunity to revitalize the industry, the technology and the approach to launch vehicles. We have an opportunity to give the nation low cost, reliable access to space. The ALS can do for space transportation what the DC-3 did for air transportation over 50 years ago.

Energiya: The Soviet Superbooster

By Phillip S. Clark

The launch of a heavy lift vehicle has been the most anticipated event in the Soviet space program. In the mid-1960s the Soviet Union was in a "race" with the Apollo program to successfully land a man on the moon and return him to earth. History records that the giant Saturn 5 booster and its Apollo spacecraft flew, and the lunar landing successfully accomplished, in July 1969. The Soviet Union was developing a giant booster which would launch a manned Soyuz spacecraft for its lunar landing mission, but the Soviet program was unsuccessful. The first of the giant boosters (variously designated G-1, G-1-e, TT-5 or SL-15 in the West) exploded on the launch pad in July 1969, the second failed at an altitude of 40 km in November 1972. The Soviet manned lunar program was scrapped.

New Launch Vehicles Planned for the 1980s

The Soviet space program underwent a serious reappraisal in the mid-1970s when new goals were set, the reliability of space systems had to be improved, and the development of a new class of launch vehicle began. Soviet rocket engines had always pushed forward the limits of technology. The RD-107/108 and RD-253 engines (used on the first stages of the Vostok and Proton launch vehicles, respectively) were the world's most advanced rocket engines when they were introduced. The planned launch vehicles would restore the Soviet Union lead in rocket engines. Two new launch vehicles were to be introduced. Although their capabilities would be different, they would share technology where possible. The first new vehicle would be a medium lift booster, with two stages capable of placing 15 to 20 tonnes in low-earth orbit. The second would be an all-new heavy lift launch vehicle that would fill the gap left by the scrapped SL-15 giant, but would use the latest technology available. The success of the Soviet space program, at least to the end of the century, would depend upon these vehicles.

The First Component Flies

The first of the new family of vehicles launched was the medium lift launch vehicle, designated SL-16 in the West after its introduction. The SL-16 made its maiden flight on 13 April 1985; it is uncertain whether the vehicle was scheduled to orbit a payload or whether it was just a sub-orbital test (possibly involving only the first stage?). The second flight on 21 June 1985, resulted in three pieces of debris being placed in orbit accidently. They were designated 1985-053A, B and C. An actual payload was orbited for the first time with the launch of Kosmos 1697 on 22 October 1985.

A trademark of the SL-16 missions is the orbiting of four small objects with altitudes somewhat higher than the second-stage rocket body. It is believed that the June 1985 fragments were three of these objects, separated to simulate orbital injection at the peak of the planned sub-orbital trajectory, but accidently given sufficient velocity to attain short-lived orbits.

To the end of 1987 there were 11 launches of the SL-16 vehicle, nine Kosmos payloads in orbit. Although there are hints that the second stage gave (at least, initially) some problems, the first stage seems to have performed well.

A New Giant Booster

It was important for the first stage of the SL-16 booster to work well because the RD-170 engine it used was to be flown as part of the giant launch vehicle scheduled for introduction. In June 1979, this writer was told by Soviet officials that a vehicle that could orbit a space station "larger than Skylab" was being developed. This was confirmed by *Aviation Week and Space Technology* a year later. Details of the new launch vehicle were few until the publication of outline sketches in the March 1983 edition of *Soviet Military Power*. Originally, the new giant booster was shown as a tandem-staged vehicle with strap-on boosters. Later the sketch was changed to show a two-stage vehicle comprising a number of strap-on boosters and a central core second stage. The payload was side-mounted, like an American shuttle orbiter.The new booster was tentatively identified as the SL-W.

Rumors abounded regarding the new vehicle's development, with reports that it was being taken onto the launch pad and returned to the assembly shop (suggesting problems?). At least some of these rumors were probably related to the use of facilities test vehicles to check out the launch complex. In the Winter of 1986-87 the vehicle was on the launch pad, with the second stage engines performing on-the-pad ignition tests.

In May 1987, Mikhail Gorbachev visited the Tyuratam launch site. With an openness previously unheard of in the Soviet space program, it was announced that he had inspected a new launch vehicle that would be used to launch a reuseable spacecraft. On 14 May, it was announced that the countdown for the first "shuttle booster" had begun, so a launch was imminent.

The First Flight of Energiya

The first flight of the Energiya booster (SL-17 in the West) came on 15 May, although it was not announced until the following day. It is rumored that there were plans to launch in daylight, but delays in the countdown postponed the launch until 21.30 Moscow Summer Time (17.30 GMT). A full report of the preparations and launch was shown on Moscow Television the following day, providing much useful information about the booster and launch complex.

The ignition of Energiya took place in at least two stages. The first event

Illustration by Karen Dow

was possibly the ignition of the four engines in the second stage core providing a thrust of 800 tonnes (vacuum equivalent). About 12 seconds later a further ignition — presumably of the four strap-on boosters — took place, followed by immediate lift-off. Timing the period required to clear the 200-m-high towers at the launch complex suggests an acceleration of 1.7g.

The four strap-ons operated successfully and landed in the eastern Soviet Union; it was unclear whether recovery was attempted or not. The second-stage core continued firing until it had almost reached orbital velocity, then it separated. A side-mounted payload included a "kick" stage system, intended to perform the final orbital injection. Problems with this stage prevented ignition from taking place cleanly, and the payload failed to reach orbit. The actual payload was not specified, but its mass was quoted as 100 tonnes; the total mass of the combined kick stage and payload was estimated to be about 130-140 tonnes from its reentry characteristics.

Details of Energiya

Considering that Energiya's maiden flight failed to orbit its payload, the Soviets have been remarkably open about the vehicle. They initially said that the launch mass was about 2,000 tonnes; the strap-ons had thrusts of about 800 tonnes each and the core used four engines, each having a thrust of 200 tonnes. Overall vehicle height was 60 m, the core diameter 8 m and each strap-on diameter was 4 m. Energiya's overall base diameter was initially said to be 20 m, but Soviet expert V.P. Glushko later refined it to 18 m.

In early 1988, copies of a new book by Glushko that included more details of the Energiya engine reached the West. It confirmed that the strap-ons used liquid oxygen and kerosene — a well-tried combination that the Soviets have used for space launchers since the first Sputnik in 1957. The engine, designated RD-170, had four combustion chambers giving a combined thrust of 806 tonnes (vacuum) making these the most powerful engines in the world. The central core second stage used four engines, each with a single combustion chamber and each having a thrust of 200 tonnes (vacuum). These engines are possibly the first Soviet use of liquid hydrogen and liquid oxygen as propellants (alternatively, it has been rumored that these propellants might have been used on the second stage of the SL-16 booster).

Knowing the launch thrust of the booster (3,600 tonnes at sea level) and the acceleration at launch (1.7g) allows the launch mass to be calculated: 2,150 tonnes approximately. The estimated details in Table 1 for the second stage suggest that some 21 tonnes of propellant was burned prior to the strap-on ignition and launch. When one scales the size of the launch vehicle, the mass suggested is about 2,650 tonnes. This shows that on its first flight, Energiya was only partially fueled.

No information was released concerning the side-mounted kick stage. This appears to have a diameter of about 4 m. About halfway up the stage/

Table 1. Details of Energiya Rocket Stages

	Strap-on	Core
Engine designation	RD-170*	—
Fuel	Kerosene*	Liquid Hydrogen*
Oxidizer	Liquid Oxygen*	Liquid Oxygen*
Thrust, tonnes	806*	4 × 200*
Specific Impulse, sec	336*	470
Length, meters	40	60*
Diameter, meters	4*	8*
Dry mass, tonnes	25	50
Propellant mass, tonnes	375	821

*Data marked with an asterisk has been specified by the Soviet Union; remaining figures are estimated. The thrust and specific impulse figures are vacuum equivalents, the sea level specific impulse for the RD-170 engine having been specified as 308 seconds.

payload assembly the diameter flairs slightly; the flair might indicate the stage/payload interface, but this is uncertain. It is assumed that the propellants are storeable — nitrogen tetroxide and UDMH, like the Proton booster — for the reconstruction presented here.

The television pictures of the launch preparations showed Energiya on the launch pad. As the camera took in more of the panorama it became clear that there was a single launch pad on either side of the one with Energiya. Therefore, we know that there are at least three Energiya pads at Tyuratam. A few other pieces of information have come out of discussions with Soviet officials. Depending upon whom one talked to, Energiya was either not reusable, partially reusable or fully reusable. It is believed that the Energiya design makes sense only if it is, at least, partially reusable. There have been indications that Energiya's core splits into three sections for its Pacific Ocean landing. This suggests that at least part of the core is to be recovered for future use. It has also been indicated that the Energiya engines — at least — are reusable. One would also expect that the strap-on boosters must also include reusable elements, possibly the engines.

Variants of Energiya

On its first flight, Energiya was fully instrumented — to the point that a further flight was not scheduled until nearly six months after the launch because the designers were still analyzing the data returned. Calculations suggest that when fully fueled the Energiya and kick-stage combination should be capable of orbiting 153 tonnes, placing its capability beyond the old Saturn 5 vehicle.

By Soviet admission, Energiya will be the space shuttle orbiter launch vehicle, although the schedule for the first manned orbiter spaceflight is unclear. It will possibly come in 1989-1990, after unmanned tests of the vehicle in space. The landing mass of the dry orbiter is estimated at about 65-70 tonnes to orbit (theoretically, heavier payloads could be carried, but they would be very dense). The Soviet orbiter does not carry the main engines — they are on the second-stage core, unlike the American orbiter — and the Soviet orbiter carries jet engines that allow the orbiter to fly around the landing strip and make second and third approaches — which the American orbiter cannot.

Private conversations with Soviet officials have also confirmed Western beliefs that Energiya can be flown with six strap-on boosters, and that this vehicle — with a 3,580-tonne launch mass — can carry a 220 to 230-tonne payload to low-earth orbit. This figure is interesting because it matches perfectly the 220-tonne payload capability for which British analysis suggests the SL-15 was designed.

The importance in matching the SL-15 capability means that *if they wanted to*, the Soviets could mount a manned lunar mission with minimal initial testing. Of the original 1960s manned lunar complex, the Soyuz, which would have carried men to the lunar surface, has been operating for more than two decades. The Proton second, which would have doubled as the SL-15 trans-lunar injection stage, and third stage (for lunar orbit, landing and launch maneuvers) have been flying successfully for the same period of time. Of course, some Soyuz systems would have to be upgraded to regain lunar capability (particularly the Soyuz propulsion systems), but with Energiya flying, all of the ''building blocks'' for the mission are available to the Soviet Union.

It will also be possible to launch a manned Mars mission if the six strap-on variant of Energiya is used to orbit a 220-230 tonne rocket stage (using the same technology as the Energiya core), which can then be used for the trans-Mars injection maneuvers.

Energiya is the most important addition to the Soviet space program in 20 years or more. With it, the Soviet Union becomes the only nation with the capability to orbit really heavy payloads. The four strap-on variant might be matched by a future American heavy lift booster, but the six strap-on variant will be the most powerful booster for the remainder of this century. After it has been test-flown, Energyia will probably be used for test flights of the shuttle orbiter. In the first half of the 1990s (probably 1992-93), it will be used to launch elements of the planned Mir-2 orbital station complex. Energiya will also be used for lunar and planetary missions. In 1987 it was stated that the booster could fly 32 tonnes to the moon or 27 tonnes to Mars and Venus. The development of Energiya is clearly important for future Soviet exploration and exploitation of space.

Source Material Used:

Most of the information presented here is extracted from the author's forthcoming book, *The Soviet Manned Space Programme*, due to be published later this year (August-September by Salamander in London; October by Orion in New York). The Moscow radio translations prepared by the British Broadcasting Corporation Monitoring Service have proved invaluable for the Soviet statements at the time of the first Energiya launch and soon afterwards. The following reference materials were used:

1. "Soviets Developing 12-Man Space Station," *Aviation Week and Space Technology*, 16 June 1980, pp 26-28.

2. *Soviet Military Power*, U.S. Department of Defense (March 1983, p 68 for the incorrect tandem configuration and March 1986, p 59 for the correct one).

3. Glushko, V.P., *Development of Rocketry and Space Research in the Soviet Union*, (in Russian), Mashinostroyeniye Press, Moscow, 1987 (3rd edition), p 154.

4. Anon, "Soviet Space Capability: Big Surprises Coming?," *Space Markets*, Autumn 1986, pp 176-180.

5. Parfitt, John and Alan Bond, "The Soviet Manned Lunar Landing Programme," *Journal of the British Interplanetary Society*, May 1987, pp 231-234.

Phillip Clark is a consultant with Commercial Space Technologies, London, England. He has studied Soviet and Chinese space programs for more than 17 years and has written widely about them.

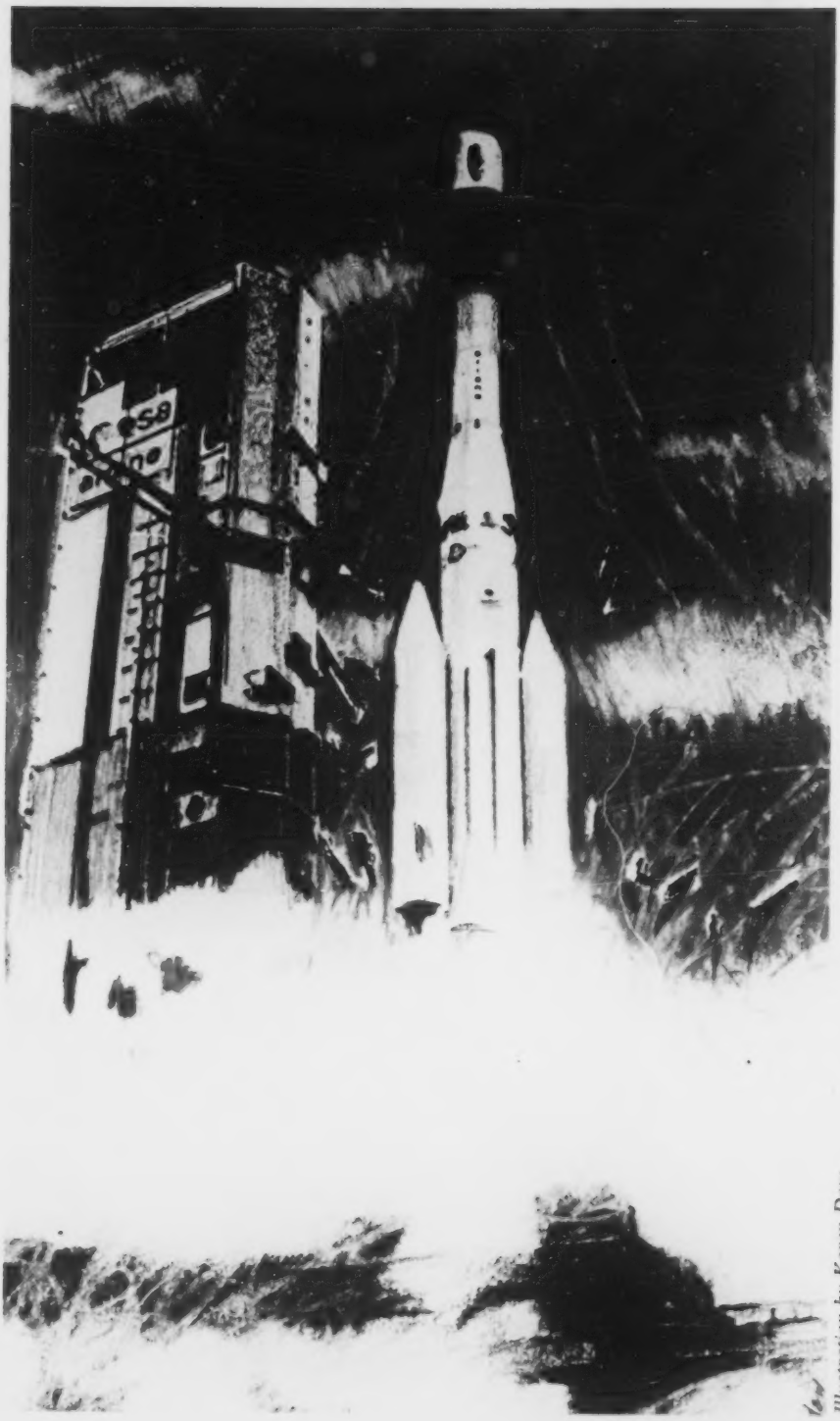


Illustration by Karen Dow

Ariane Overview: The Next Generation

As this issue of Space Log goes to press, the attention of most of the world's commercial space users is focused on the scheduled first flight of Europe's Ariane 4. The success of this increased-lift vehicle—at a time when the space community is hungry for reliable, workhorse launchers—will significantly strengthen Europe's position in the international launch market for telecommunications, earth observation and science payloads.

In spite of intense efforts by the U.S., USSR, Japan and China to upgrade their expendable launch capabilities, Europe expects to excel in this field through the 1990s and well into the 21st century . . . primarily because of its ambitious Ariane program.

Ariane 4 is the latest flight-ready member of the family of boosters that date back to December 1973, when the European Space Agency (ESA) approved development of the first Ariane 1. This three-stage launcher, along with its descendants Ariane 2 and 3, was destined to tap the lucrative commercial launch business. The new Ariane 4 incorporates most of the design features of its predecessors and adds the extra lift capability and flexibility needed by space users until about 1995, when ESA plans to qualify a new Ariane 5 launch system.

Ariane 4 comes in six different versions for placing a variety of payloads into geostationary transfer orbit (GTO). The lengthened first stage contains 226 tons of propellant and is powered by four Viking V engines. For added lift, it can be fitted with two or four strap-on boosters, using solid or liquid propellant or a combination of the two. These options provide a range of lift capabilities from 1,900 to 4,200 kg (4,190 to 9,260 lbs). Ariane 4 also has reinforced second and third stages, a larger fairing, and an integrated payload-bay structure called "Spelda," for Structure Porteuse Externe de Lancements Double Ariane (external support structure for Ariane dual launches). This structure accommodates a second spacecraft for dual launches.

Ariane 4's maiden flight, from the ESA's launch facility at Kourou, French Guiana, carries three payloads: Europe's Meteosat P2 weather satellite, the U.S. Panamsat telecommunications satellite and an Amsat radio amateurs' satellite.

Arianespace, which produces, markets and operates Ariane, expects this new launcher to perform routine, regular flights, with a schedule for eight missions this year and nine missions in 1989. Production plans are for 70 Ariane 4s to meet the anticipated needs of commercial users through the mid-1990s. Europe's space ambitions, however, extend well beyond 1995, and much of its optimism rides with the Ariane 5, a launch vehicle now in development that will bear little resemblance to the rest of the Ariane

family, except for its dual-launch capability. Ariane 5's increased power and capacity, along with its reliability and economy, are expected to make the launcher a strong contender for future space business. Its developers look to a time when different versions of the Ariane 5 will be launching large commercial satellites into geostationary transfer and sun-synchronous orbits, heavy payloads for Space Station operations into low-earth orbit, as well as the manned Hermes spaceplane into the same orbit.

Ariane 5's development is aimed toward a vehicle for economical dual-launch of larger and heavier satellites to GTO, plus the capacity to carry large single modules or platforms to low-earth orbit. It will handle payloads with diameters up to 4.6 m and heights up to 10.5 m, and it will be capable of placing 6.8 tons in GTO and approximately 18 tons in low-earth orbit.

All versions of the Ariane 5 will have the same first stage, which comprises: 1) a large central body containing a Vulcain cryogenic motor and liquid oxygen/liquid hydrogen propellants, and 2) two segmented strap-on boosters using solid propellant. Upper-stage configurations will depend on the type of mission. Three versions for single, dual or triple payload configurations, will have an L5 upper stage using storable liquid propellants, and one version will be assigned to carry the Hermes spaceplane.

Past launch failures have afflicted the Ariane program as well as those of the U.S. and other nations. Therefore, high reliability will be demanded of the Ariane 5, whether or not it is assigned to carry a manned vehicle. The total mission reliability rate goal is 98 percent for unmanned Ariane 5 missions, and 99.9 percent for manned missions.

Ariane 5's development time frame is similar to that of the international Space Station, and it is being groomed as a prime launch candidate for Europe's Columbus program. Its long fairing is designed to accommodate the unique sizes and weights of the Columbus elements. The first commercial flight to put an automatic payload into orbit is planned for early 1996, with the vehicle carrying either conventional satellites or the Columbus Polar Platform.

Approximately 80 percent of GTO missions are expected to be dual launches with 2 satellites weighing 2,800-3,200 kg (6,170-7,058 lbs). The remainder is likely to be triple launches with one 2,800 kg (6,170 lb) satellite coupled with two satellites of 1,200-1,600 kg (2,645-3,527 lbs). Arianespace's goal is to lower the cost of multiple launches to GTO below that of the Ariane 4 vehicle, the cost of which is already below the Ariane 1, 2 and 3. The Ariane 5 will undergo additional development work for its role as a manned flight launch vehicle. The first version designed to carry the Hermes spaceplane is planned for late 1997. The French-inspired Hermes is a small, manned craft being tailored for on-orbit servicing, repair, resupply, and transfer duties associated with the Space Station and other space operations.

Some of the early Ariane 5 boosters will use a parachute recovery system so they can be retrieved and analyzed, but program planners have decided

that it is not economically practical to recover and refurbish the launcher for other missions.

The ESA is building a new launch complex for the Ariane 5, close to the Agency's existing ELA-1 and ELA-2 complexes in Kourou, French Guiana. This complex will serve Ariane 5's three planned launches in 1996. Full capacity—seven to nine launches—is scheduled by 1999. By then, the last Ariane 4's will be phased out; Ariane's future expendable launch vehicle will have arrived.

Ariane 4 was successfully launched June 15, 1988.

Box Score of U.S. Launches

Worldwide record of known successful U.S. space launches

International payloads are listed when launched by U.S. booster. Classified U.S. payloads are listed by launch vehicle.

*Payload(s) injected into orbit

1957	1958	1959	1960	1961
Vanguard TV 3	Score Pioneer 3 Pioneer 1 Explorer 4 Explorer 3 Vanguard 1 Explorer 1 --- Pioneer 2 Beacon 1 Vanguard SLV 3 Explorer 5 Able 1 Vanguard SLV 2 Vanguard SLV 1 Vanguard TV 5 Explorer 2 Vanguard TV 3A	Discoverer 0 Discoverer 7 Explorer 7 Vanguard 3 Discoverer 6 Discoverer 5 Explorer 6 Discoverer 2 Pioneer 4 Discoverer 1 Vanguard 2 --- Atlas-Able 4 Transit 1A Beacon 2 Explorer S-1 Discoverer 4 Vanguard SLV 6 Discoverer 3 Vanguard SLV 5	Discoverer 19 Discoverer 18 Tiros 2 Discoverer 17 Explorer 8 Courier 1B Discoverer 15 Discoverer 14 Echo 1 Discoverer 13 Transit 2A Midas 2 Discoverer 11 Transit 1B Tiros 1 Pioneer 5 --- Atlas-Able 5B Explorer S-56 Transit 3A Discoverer 16 Samos 1 Atlas-Able 5A Courier 1A Discoverer 12 Echo A 10 Explorer S-46 Midas 1 Discoverer 10 Discoverer 9	Atlas-Agena B Discoverer 36 Mercury-Atlas 5 Ranger 2 Transit 4B Discoverer 35 Discoverer 34 Midas 4 Discoverer 32 Discoverer 31 Mercury-Atlas 4 Discoverer 30 Discoverer 29 Explorer 13 Ranger 1 Explorer 12 Midas 3 Tiros 3 Discoverer 26 Transit 4A Discoverer 25 Explorer 11 Discoverer 23 Explorer 10 Transit 3B Discoverer 21 Discoverer 20 Explorer 9 Samos 2 --- Atlas-Agena B Mercury-Scout 1 Discoverer 33 Samos 3 Discoverer 28 Discoverer 27 Explorer S-55 Discoverer 24 Explorer S-45A Mercury-Atlas 3 Discoverer 22 Explorer S-45
*Successes: 0 Failures: 1 Total: 1	*Successes: 7 Failures: 10 Total: 17	*Successes: 11 Failures: 8 Total: 19	*Successes: 16 Failures: 13 Total: 29	*Successes: 29 Failures: 12 Total: 41

Transit 5A
Explorer 16
Thor-Agena D
Relay 1
Thor-Agena D
Thor-Agena D
Thor-Agena B
Atlas-Agena B
Thor-Agena B
Anna 1B
Explorer 15
Starad
Ranger 5
Thor-Agena B
Mercury-Atlas 8
Explorer 14
Thor-Agena D
Alouette 1
Tiros 6
Thor-Agena B
Thor-Agena B
Thor-Agena D
Mariner 2
Scout
Atlas-Agena B
Thor-Agena D
Thor-Agena B
Thor-Agena B
Atlas-Agena B
Telstar 1
Thor-Agena D
Thor-Agena B
Tiros 5
Thor-Agena B
Atlas-Agena B
Thor-Agena B
Thor-Agena B
Mercury-Atlas 7
Thor-Agena B
Thor-Agena B
Atlas-Agena B
Ariel 1
Ranger 4
Thor-Agena B
Atlas-Agena B
Atlas-Agena B
OSO 1
Discoverer 38
Thor-Agena B
Mercury-Atlas 6
Tiros 4
Ranger 3

Atlas-Agena B
Mariner 1
Scout
Anna 1A
Solrad 4B
Composite 1
Discoverer 37

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*Successes: 52
Failures: 7
Total: 59

1962

TAT-Agena D
Tiros 8
Explorer 19
Atlas-Agena D
Thor-Able Star
Thor-Agena D
Atlas-Centaur 2
Explorer 18
TAT-Agena D
Atlas-Agena D
Vela 1 & 2
Thor-Able Star
TAT-Agena D
Atlas-Agena D
Thor-Agena D
TAT-Agena D
TAT-Agena D
Syncom 2
Atlas-Agena B
Thor-Agena D
Atlas-Agena D
TAT-Agena B
Geophysical Research Satellite
TAT-Agena D
Tiros 7
Scout
Thor-Agena D
TAT-Agena D
TAT-Agena D
Mercury-Atlas 9
Atlas-Agena B
Telstar 2
Explorer 17
Thor-Agena D
Scout
Syncom 1
Thor-Agena D
Thor-Agena D

Thor-Agena D
Scout
Atlas-Agena B
Thor-Agena D
Scout
Scout
TAT-Agena D
TAT-Agena D

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*Successes: 38
Failures: 8
Total: 46

1963

TAT-Agena D
Explorer 26
TAT-Agena D
San Marco 1
Thor-Able Star
Atlas Centaur 4
Transtage
Atlas-Agena D
Mariner 4
Explorer 24 & 25
TAT-Agena D
Explorer 23
Mariner 3
TAT-Agena D
TAT-Agena D
Atlas-Agena D
TAT-Agena D
Explorer 22
Thor-Able Star
TAT-Agena D
Explorer 21
Atlas-Agena D
Saturn SA-7
TAT-Agena D
OGO 1
Nimbus 1
Explorer 20
TAT-Agena D
Syncom 3
Atlas-Agena D
TAT-Agena D
Ranger 7
Vela 3 & 4
TAT-Agena D
Atlas-Agena D
TAT-Agena D
TAT-Agena D
Thor-Agena D
TAT-Agena D
TAT-Agena D
Scout
Saturn SA-6
Atlas-Agena D
TAT-Agena D
Atlas-Agena D
Gemini-Titan 1
Ariel 2
Atlas-Agena D
TAT-Agena D
Atlas-Agena D
TAT-Agena D
Ranger 6
Saturn SA 5
Echo 2
Relay 2
Thor-Agena D
TAT-Agena D

Atlas-Agena D
Titan IIIA
Atlas Centaur
Environmental Sciences Research Satellite
Thor-Able Star
TAT-Agena D
Beacon-Explorer A

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*Successes: 57
Failures: 7
Total: 64

1964

TAT-Agena D
Scout
LES 3, 4 et. al.
Pioneer 6
Gemini 6
TAT-Agena D
FR 1
Gemini 7
Alouette 2 et. al.
Explorer 30
Atlas-Agena D
Explorer 29
TAT-Agena D
OV2 1, LCS 2
OGO 2
TAT-Agena D
OV1 2
Atlas-Agena D
TAT-Agena D
Thor-Altair
Gemini 5
TAT-Agena D
Surcal et. al.
Atlas-Centaur 6
Secor 5
Atlas-Agena D
Pegasus 3
Vela 5 & 6
TAT-Agena D
TAT-Agena D
Tiros 10
Atlas-Agena D
Thor-Able Star
Titan IIIC
TAT-Agena D
Gemini 4
Explorer 28
Atlas-Agena D
Pegasus 2
Thor-Altair
TAT-Agena D
LES 2, ECS 1
TAT-Agena D
Explorer 27
Atlas-Agena D
Early Bird
Snapshot
TAT-Agena D
Gemini 3
Ranger 9
Thor-Altair
Atlas-Agena D
Thor-Able Star
GGS 2 & 3 et. al.
TAT-Agena D
Ranger 8
Pegasus 1
LES 1
OSO 2
Atlas-Agena D
Tiros 9
Thor-Altair
TAT-Agena D

Gemini 6 Target
Thor-Agena D
OSO C
Atlas-Agena D
OV1 3
Atlas Centaur
OV1 1

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*Successes: 63
Failures: 7
Total: 70

1965

TAT-Agena D
Biosatellite 1
Titan IIIB-Agena D
OV1 9 & 10
ATS 1
Atlas-Agena D
Gemini 12
Gemini 12 Target
TAT-Agena D
Lunar Orbiter 2
OV4 3 et. al.
Atlas-Agena D
OV3 2
Atlas Centaur 9
Intelsat IIA
Atlas-Agena D
EGRS-8
ESSA 3
Titan IIIB-Agena D
TAT-Agena D
Surveyor 2
Atlas-Agena D
Thor-Burner II
Gemini 11
Gemini 11 Target
ERS 15
Scout
Pioneer 7
Atlas-Agena D
Lunar Orbiter 1
Thorad-Agena D
OV3 3
Titan IIIB-Agena D
Gemini 10
Gemini 10 Target
OV1 8
Atlas-Agena D
Saturn I
Explorer 33
Pageos
TAT-Agena D
IDCSP 1-7, GGTS 1
OV3 4
Secor 6, ERS 16
OGO 3
Atlas-Agena D
Gemini 9
Gemini 9, Target B
Surveyor 1
Explorer 32
TAT-Agena D
Scout
Nimbus 2
Atlas-Agena D
OV3 1
Atlas-Agena D
OAO 1
Atlas Centaur
TAT-Agena D
Thor-Altair
OV1 4 & 5
Scout
Atlas-Agena D
Gemini 8
Gemini 8 Target
TAT-Agena D
ESSA 2
Atlas-Agena D
TAT-Agena D
ESSA 1
TAT-Agena D
Scout
Atlas-Agena D

IDCSP (8 satcoms)
Gemini 9 Target A
TAT-Agena D
Thor-Altair

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*Successes: 73
Failures: 4
Total: 77

1966

Pioneer 8
LTTAT-Agena D
Titan IIIB-Agena D
OV3 6
ESSA 6
Apollo 4
Surveyor 5
ATS 3
LTTAT-Agena D
Titan IIIB-Agena D
OSO 4
Thor-Burner II
Intelsat IID
Scout
Titan IIIB-Agena D
LTTAT-Agena D
Surveyor 5
Biosatellite 2
Thor-Burner II
Titan IIIB-Agena D
LTTAT-Agena D
Lunar Orbiter 5
OGO 4
OV1 12 & 88
TAT-Agena D
Explorer 35
Surveyor 4
ISCSP 16-18 et. al.
Secor 9, Aurora 1
Titan IIIB-Agena D
LTTAT-Agena D
Mariner 5
Atlas-Agena D
GGSE 4, 5 et. al.
Explorer 34
Atlas-Agena D
Scout
LTTAT-Agena D
Ariel 3
Lunar Orbiter 4
Vela 7, 8 et. al.
San Marco 2
ESSA 5
Surveyor 3
Scout
ATS 2
TAT-Agena D
Intelsat IIC
OSO 3
Titan IIIB-Agena D
TAT-Agena D
Thor-Burner II
Lunar Orbiter 3
Atlas-Agena D
ESSA 4
IDCSP 8-15
TAT-Agena D
Intelsat IIB

ESRO 2A
Titan IIIB-Agena D
OV3 5

***Successes: 58**
Failures: 3
Total: 61

1967

Apollo 8
Intelsat IIIB
ESSA 8
LTTAT-Agena D
OAO 2
HEOS 1
Titan IIIB-Agena D
Pioneer 9, TETR 2
Titan IIIB-Agena D
TAT-Agena D
Thor-Burner II
Apollo 7
LTTAT-Agena D
Aurorae (ESRO 1A)
OV2 5 et. al.
TAT-Agena D
Titan IIIB-Agena D
ESSA 7
ATS 4
Explorer 39 & 40
LTTAT-Burner II
Titan IIIB-Agena D
Atlas-Agena
OV1 15 & 16
Explorer 38
LTTAT-Agena D
IDSCS 19-26
Titan IIIB-Agena D
Thor-Burner II
Iris (ESRO 2B)
LTTAT-Agena D
Titan IIIB-Agena D
OV1 13 & 14
Apollo 6
LTTAT-Agena D
Titan IIIB-Agena D
Explorer 37
OGO 5
Scout
LTTAT-Agena D
Apollo 5
Titan IIIB-Agena D
TAT-Agena D
Explorer 36
Surveyor 7

Intelsat IIIA
OV5 8 et. al.
Nimbus B, Secor 10

***Successes: 45**
Failures: 3
Total: 48

1968

Thorad-Agena D
Skynet 1
Apollo 12
Azur 1 (GRS A)
Titan IIIB-Agena D
Boreas (ESRO 1B)
LTTAT-Agena D
LTTAT-Agena D
Titan IIIB-Agena D
ATS 5
OSO 6, PAC 1
LTTAT-Agena D
Intelsat IIIE
LTTAT-Agena D
Thor-Burner II
Apollo 11
Biosatellite 3
Explorer 41
OGO 6
Titan IIIB-Agena D
Vela 9, 10 et. al.
Intelsat IIID
Apollo 10
LTTAT-Agena D
Titan IIIB-Agena D
Nimbus 3, Secor 13
Atlas-Agena D
Mariner 7
LTTAT-Agena D
OV1 17,18 19 & 17A
Titan IIIB-Agena D
Apllo 9
ESSA 9
Mariner 6
Tacsat 1
Intelsat IIIC
LTTAT-Agena D
ISIS 1
Titan IIIB-Agena D
OSO 5

Pioneer E, TETRC

***Successes: 40**
Failures: 1
Total: 41

1969

Explorer 42
NOAA 1
Thorad-Agena D
OFO 1, RM
Titan IIIC
Titan IIIB-Agena D
Thor-Burner II
Thor-Agena D
Scout
Thorad-Agena D
Skynet II
Titan IIIB-Agena D
Intelsat III F-8
Titan IIIB-Agena D
Titan IIIB-Agena D
Atlas-Agena D
Thor-Agena D
Intelsat III F-7
Titan IIIB-Agena D
Apollo 13
Vela 11, 12
Nimbus 4, TOPO 1
NATO 1
Thorad-Agena D
Thor-Burner II
SERT 2
ITOS 1, Oscar 5
Intelsat III F-6
Titan IIIB-Agena D

OAO B

***Successes: 29**
Failures: 1
Total: 30

1970

Intelsat IV F-3
Thorad-Agena D
Ariel 4
Explorer 45
OSCS II-A1, A2
Titan IIIB-Agena D
NOAA 2
Space Test Program
Thor-Burner II
OSO 7, TETR 4
LTTAT-Agena D
EOLE 1
Titan IIIB-Agena D
Titan IIIB-Agena D/
OV1 20 et. al.
Apollo 15, P&F
Thorad-Agena D
Explorer 44
Titan IIID
Thor-Burner II
Mariner 9
Titan IIIC
San Marco 3
Titan IIIB-Agena D
ISIS 2
LTTAT-Agena D
Titan IIIB-Agena D
Explorer 43
Thor-Burner II
NATO 2
Apollo 14
Intelsat IV F-2
Titan IIIB-Agena D

Atlas-Agena D
Mariner H
Thorad-Agena D

***Successes: 32**
Failures: 3
Total: 35

1971

1972	1973	1974	1975	1976
Titan 38 Agena	Explorer 51	Symphonie	Titan IIIC	Titan IIID
Atlas Agena	OSCS II B3, B4	Helios	RCA Satcom 1	Marisat 3
Aeros	Skylab 4	Skynet 2B	Titan IIID	Titan IIIB Agena
Nimbus 5	Titan IIID	Intelsat IV F-8	Explorer 55	AMS 1
Apollo 17	NOAA 3	NOAA	GOES 1	TIP 3
ESRO IV	Mariner 10	Titan IIID	TIP 2	Satellite Data Sys. 2
Explorer 48	Transit	Ariel 5	Titan IIIB	NOAA 5
ANIK 1	Explorer 50	Westar B	Explorer 54	Comstar 2
Thor Burner II	Titan IIIB Agena D	ANS	Intelsat IVA F-1	Palapa 1
NOAA 2, OSCAR 6	Intelsat IV F-7	Titan IIIB Agena	Viking 2	Titan IIID
Titan IIID	Titan IIIB Agena D	Thor Burner IIA	Symphonie B	Titan IIIC
Atlas F Burner II	Thor Burner II	Aeros 2	Viking 1	Marisat 2
Explorer 47	Skylab 3	Timation 3	COS B	Titan IIIB
Triad OI-1	Titan IIID	Titan IIIB Agena	Apollo 18	P76-5
Titan IIIB Agena	Titan IIIC	Hawkeye	OSO 8	Comstar 1
OAO 3	Explorer 49	ATS 6	Atlas Agena	Lageos 1
Explorer 46	Skylab 2	SMS 1	Nimbus 6	Atlas
ERTS 1	Titan IIIB Agena D	Westar A	SSU 1	Nato IIIA
Titan IIID	Skylab 1	Titan IIID	DMSP	RCA Satcom 2
Intelsat IV F-5	Anik 2	Thor Burner IIA	Intelsat IV F-1	Titan IIIB Agena D
Thorad Agena	Pioneer 11	UK X4 (Miranda)	DSCS II B5, B6	Titan IIIC
Thorad Agena	Titan IIID	San Marco 4 (C2)	ANIK 3	Marisat 1
Apollo 16, P&F	Atlas Agena D	Titan IIIB Agena	Explorer 53	Thor Burner 2
Thor Burner II		Skynet 2A	Titan IIIB	Intelsat IVA F-2
Titan IIIB Agena			GEOS 3	CTS
TD 1A			Titan IIIB	Helios 2
Pioneer 10			SMS 2	
Titan IIIC			Landsat 2	
HEOS A2				
Intelsat F IV				
Titan IIID				
Titan IIIB Agena	ITOS-E	Viking Proof Test	Explorer	
Titan IIIB Agena	Titan IIIB Agena D		Atlas F	
			Intelsat IV F-6	
*Successes: 31	*Successes: 23	*Successes: 24	*Successes: 28	*Successes: 26
Failures: 2	Failures: 2	Failures: 1	Failures: 3	Failures: 0
Total: 33	Total: 25	Total: 25	Total: 31	Total: 26

1977	1978	1979	1980	1981
Sakura	Anik 4			
Atlas-Agena D	DSCS II-C11, C12			
NOSS 2	GPS 4			
Meteosat 1	NATO IIIC			
Transit	HEAO 2			
ISEE 1 & 2	Nimbus 7/Cameo			
Titan IIIB	Tiros N			
Voyager 1	GPS 3			
Sirio	ISEE 3			
Voyager 2	Pioneer Venus/Multiprobe			
HEAO 1	Titan IIIB-Agena D			
Himawari (GMS-1)	GEOS 2			
Titan IIID	Comstar 3			
NTS-2	Seasat 1			
GOES 2	GOES 3			
DMSP	Titan IIID			
Intelsat IVA F-4	Titan IIIC			
Atlas-Agena	Pioneer Venus/Orbiter			
DSCS II-C7, C8	NDS 2			
GEOS	OTS-2			
Titan IIID	DMSP	Satcom 3		
Palapa 2	HCMM	DSCS II-D13, D14	Titan IIIB-Agena	
Titan IIIC	YURI	Magsat	Intelsat V F-2	
Nato IIIB	BMEWS II	Titan III C	SBS-1	
	Intelsat IVA F-6	HEAO 3	FLTSATCOM 4	
	Titan IIID	Westar 3	GOES 4	
	Landsat 3/Oscar 8	NOAA 6	Titan IIID	
	Titan IIIB-Agena 4	Titan IIIC	NOAA B(7)	
	NDS-1	DMSP	GPS-6	
	FLTSATCOM 1	UK 6	Atlas F	
	IUE	Titan IIIB	Solar Max	
	Intelsat IVA F-3	FLTSATCOM 2	GPS-5	
		Titan IIID	Titan IIID	
		P78-1	FLTSATCOM 3	
		SAGE		
		SCATHA		
Intelsat IVA	DSCS II-C9, C10		Thor	
DTS			Atlas F	
				NAVSTAR-GPS
*Successes: 24	*Successes: 32	*Successes: 16	*Successes: 13	*Successes: 18
Failures: 2	Failures: 1	Failures: 0	Failures: 2	Failures: 1
Total: 26	Total: 33	Total: 16	Total: 15	Total: 19

STS Launched Satellites
(not included in launch totals)

1982	1983	1984	1985	1986
Anik C3 & SBS-3 launched by PAM-d (STS-5)	TDRS launched by IUS (STS-6) Anik C2 and Palapa B1 launched by Pam-D (STS-7) Insat 1B launched by Pam-D (STS-8)	LDEF by RMS (STS 41-C) SBS4 by Pam-D, (STS 41-D) Leasat 1 by PKM (STS 41-D) Telstar 3C by Pam-D (STS 41-D) ERBS by RMS (STS 41-G) Anik D2 by Pam-D (STS 51-A) Leasat 2 by PKM (STS 51-A)	Anik C1 by Pam-D (STS 51-D) Leasat 3 by PKM (STS 51-D) Nusat (STS 51-B) Morelos 1 by Pam-D (STS 51-G) Arabsat 1B by Pam-D (STS 51-G) Telstar 3D by Pam-D (STS 51-G) Aussat 1 by Pam-D (STS 51-I) ASC 1 by Pam-D (STS 51-I) Leasat 4 by PKM (STS 51-I) Morelos 2 by Pam-D (STS 61-B) Aussat 2 by Pam-D (STS 61-B) Satcom K-2 by Pam D2 (STS 61-B) Glomr (STS 61-A)	Satcom K-1 by Pam D2 (STS 61-C)
Atlas E Titan IIID STS-5 DSCS II-F16, DSCS III-A1 RCA Satcom V Intelsat V F-5 Anik D-1 Landsat 4 STS 4 Westar V Titan IIID Insat 1A STS-3 Titan IIIC Intelsat V F-4 Westar VI Titan III RCA Satcom IV	STS-9 Atlas F Galaxy 2 RCA Satcom VII STS-8 Titan IIIB-Agena D Telstar 301 (J-1) Atlas F Galaxy 1 Scout Titan 34D STS-7 Atlas Exosat Intelsat V F-6 GOES 6 Titan IIIB RCA Satcom VI STS-6 NOAA-8 Atlas IRAS	Titan 34D NOAA-9 Titan 34D Nato 3D STS 51-A Nova 3 STS 41-G Galaxy 3 Navstar 10 STS 41-D Titan IIIB Ampte 1,2,3 Titan 34D Navstar 9 Intelsat VA F-9 Titan IIIB Titan 34D STS 41-C Landsat 5 Atlas F STS 41-B Titan 34D	Scout STS 61-B STS 61-A Navstar 11 STS 51-J Intelsat VA F-12 STS 51-I Scout STS 51-F Intelsat VA F-11 STS 51-G STS 51-B STS 51-D Intelsat VA F-10 Geosat Titan IIIB STS 51-C Titan 34D	FLTSATCOM 7 Polar BEAR NOAA-10 Delta Atlas F STS 61-C GOES 7 Titan 34D STS 51-L
*Successes: 18 Failures: 0 Total: 18	*Successes: 22 Failures: 0 Total: 22	*Successes: 22 Failures: 0 Total: 22	*Successes: 17 Failures: 1 Total: 18	*Successes: 6 Failures: 3 Total: 9

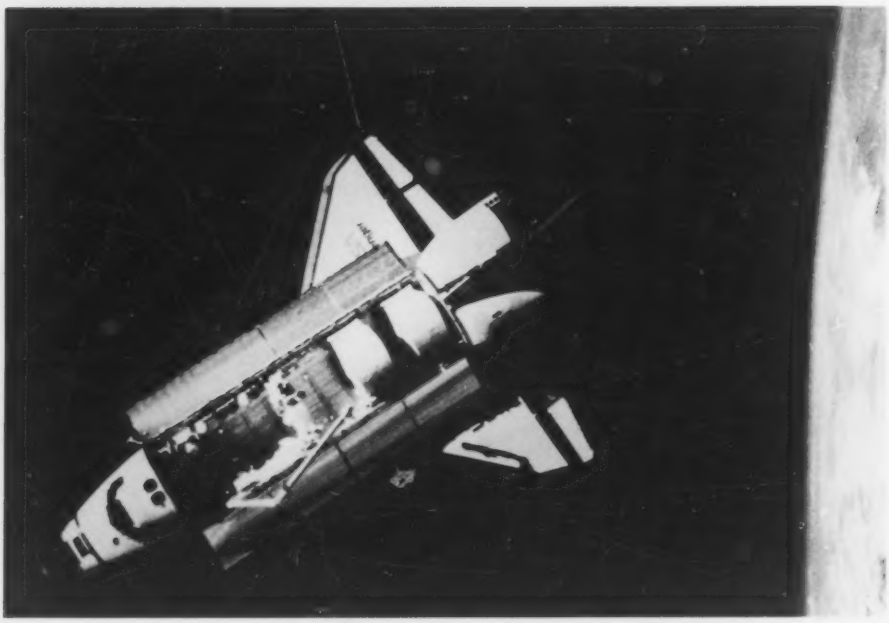
Titan 34D
Titan 34D
Oscar 31, 32
DMSP
Atlas
Palapa B2P
GOES 7
Titan IIIB

FLTSATCOM 6

*Successes: 8
Failures: 1
Total: 9

1987

STS Payload Deployment Record 1982-1987



Year	Successes*	Failures	Total
1982	2	0	2
1983	4	1**	5
1984	8	2†	10
1985	18	1‡	19
1986	1	0	1
Total	**33**	**4**	**37**

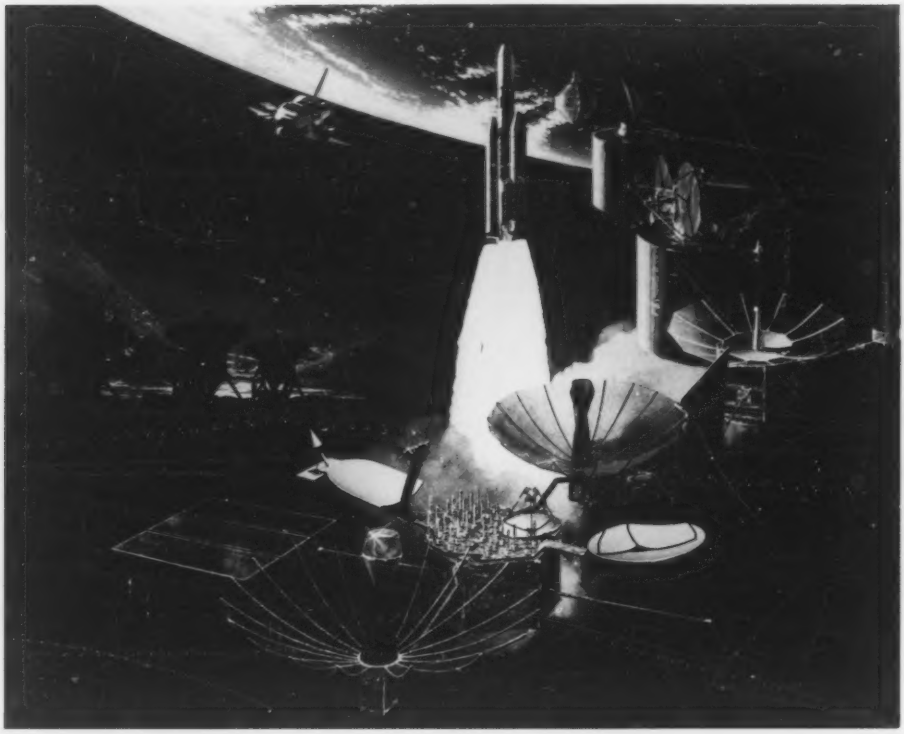
*Includes satellites, platforms, experiments

**IUS failure cast Tracking and Data Relay Satellite into incorrect orbit; spacecraft subsequently boosted to geosynchronous orbit using its own thrusters

†Perigee kick motor failures. Westar VI and Palapa B returned to earth on later STS mission

‡Faulty switch prevented perigee kick motor firing; Leasat 3 repaired on orbit on later STS mission and successfully boosted into geosynchronous orbit

Payloads in Orbit



Australia	4	Japan	34
Brazil	2	Mexico	2
Canada	14	NATO	6
ESA	15	PRC	4
France	14	Saudi Arabia	2
France/FRG	2	Spain	1
FRG	6	Sweden	1
India	7	UK	9
Indonesia	4	US	528
ITSO	35	USSR	1,045
Italy	1		
Subtotal	104	Subtotal	1,632
Total			**1,736**

As of December 31, 1987

Manned Space Flight Records

	Total Flights	Earth Missions	Lunar Missions	Total Crew-hours
United States	55	46	9	42,453
USSR	62	62	–	121,314
Total	**117**	**108**	**9**	**163,767**

In 1987, the Soviets maintained a permanent manned presence in orbit; personnel visits overlapped. Mission durations can be broken down as follows:

Main Expedition 2 (TM-2): 326 days, 11 hours, 38 mns × 2 cosmonauts = 15,671 hrs, 16 mn

Visit 1 (TM-3): 7 days, 23 hrs, 5 mns × 3 cosmonauts = 573 hrs, 15 mn

Visit 2 (TM-4): 7 days, 21 hrs, 58 mns × 1 cosmonaut = 189 hrs, 58 mn

Main Expedition 3 (TM-4): 10 days, 12 hrs, 42 mns × 2 cosmonauts (through 12/31/87) = 505 hrs, 24 mn

Total 1987: 16,939 hrs, 53 mn

First manned flight: Vostok 1
First EVA: Voskhod 2
Longest mission: Soyuz TM-2 (326 days, 11 hrs, 38 mns)
First rendezvous mission: Gemini 7 and 6
First docking flight: Gemini 8
First lunar orbit: Apollo 8
First crew exchange: Soyuz 4,5
First manned lunar landing: Apollo 11
First triple launch/manned: Soyuz 6,7,8

Heaviest manned spacecraft:
On-orbit – STS 41-D (119,491 kg)
At liftoff – STS 51-A (2,049,842 kg)
First use of reusable manned spacecraft: STS 1
First modular space station assembly: Salyut 7/Kosmos 1443
First retrieval, repair of satellite: STS 41-C
First space construction: STS 61-B
First station to station crew transfer: Mir/Soyuz T-15 to Salyut 7

Summary Log of Space Launches

The Summary Log lists all known orbital launches through December 31, 1987. Data was compiled from the Goddard Space Flight Center *Satellite Situation Report*; Teledyne Brown Engineering's *The Soviet Year in Space 1987*; The Royal Aircraft Establishment *Table of Artificial Satellites*; United Nations registration documents; The British Planetary Society's *Spaceflight*; The Science Policy Division, Congressional Research Service, Library of Congress; and public announcements from agencies responsible for project direction. 1957–1986 data has been revised based on recent Soviet disclosures and United Nations registration documents. While every effort is made to verify the accuracy of the data, some information varies from source to source and discrepancies may occur.

Launch Date: Universal time

Launch Site:

ESMC	=	Eastern Space and Missile Center, Cape Canaveral, FL
KSC	=	Kennedy Space Center, FL
WSMC	=	Western Space and Missile Center, Vandenberg AFB, CA
STS	=	Space Transportation System
ETR	=	Eastern Test Range (now ESMC)
WTR	=	Western Test Range (now WSMC)
WI	=	Wallops Island, VA

Weight: Launch weight in kilograms unless otherwise indicated; Soviet, Chinese weights are approximate.

Orbital Data: Initial data for satellites launched and reentered or decayed(1957-1987); current for satellites still in orbit (December 31, 1987)

Period: Minutes

Perigee and Apogee: Kilometers

Inclination: Degrees to the equator

Worldwide Successful Space Launches

Year	USSR	US†	France	Australia	China	Japan	UK	ESA**	India	Total
1957	2									2
1958	1	7								8
1959	3	11								14
1960	3	16								19
1961	6	29								35
1962	20	52								72
1963	17	38								55
1964	30	57								87
1965	48	63	1							112
1966	44	73	1							118
1967	66	58*	2	1						127
1968	74	45								119
1969	70	40								110
1970	81	29*	2		1	1				114
1971	83	32*	1		1	2	1			120
1972	74	31*				1				106
1973	86	23								109
1974	81	24*				1				106
1975	89	28*	3		3	2				125
1976	99	26			2	1				128
1977	98	24				2				124
1978	88	32			1	3				124
1979	87	16				2		1		106
1980	89	13				2			1	105
1981	98	18			1	3		2	1	123
1982	101	18			1	1				121
1983	98	22‡			1	3		2‡	1	127
1984	97	22			3	3		4		129
1985	98	17			1	2		3		121
1986	91	6			2	2		2		103
1987	95	8			2	3		2		110
Total	**2,017**	**878**	**10**	**1**	**19**	**34**	**1**	**16**	**3**	**2,979**

* Italy has launched eight spacecraft from its San Marco platform. U.S. Scout rockets were used for these launches, so NASA includes them in the U.S. launch total.

** European Space Agency

† Does not include payloads launched from space shuttle.

‡ ESA launch from WSMC used U.S. Delta 3914 and is included in U.S. total

Table based on information reported by the Science Policy Research Division, Library of Congress

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Sputnik 1	1957 A2	USSR	Oct 4	Tyuratam	A	83.6	96.2	215	939	65.1	Decayed 1/4/58: 1st artificial satellite, transmitted 21 days
Sputnik 2	1957 B1	USSR	Nov 3	Tyuratam	A	508.3	103.7	212	1,660	65.3	Decayed 4/14/58: carried dog Laika; transmitted 7 days
Vanguard TV 3	None	USN	Dec 6	ETR	Vanguard	1.35	–	–	–	–	Failed to orbit: lost thrust after 2 seconds
Explorer 1	1958 A1	USA	Feb 1	ETR	Jupiter C	4.8	114.7	356	2,548	33.3	Decayed 3/31/70: transmitted until 5/23/58, discovered Van Allen radiation belt
Sputnik 3-1	None	USSR	Feb 3	Tyuratam	A	1,250					Failed to orbit
Vanguard TV 3 (Backup)	None	USN	Feb 5	ETR	Vanguard	1.35	–	–	–	–	Failed to orbit: control system malfunction
Explorer 2	None	USA	Mar 5	ETR	Jupiter C	5	–	–	–	–	Failed to orbit: unsuccessful 4th stage ignition
Vanguard 1	1958 B2	USN	Mar 17	ETR	Vanguard	1.47	133.6	653	3,897	34.2	In orbit: transmitted "pear-shaped earth" data until 5/64
Explorer 3	1958 Γ1	USA	Mar 26	ETR	Jupiter C	5	114.7	186	2,799	33.5	Decayed 6/28/58: radiation, micrometeoroid data until 6/16/58
Vanguard TV 5	None	USN	Apr 28	ETR	Vanguard	1.35	–	–	–	–	Failed to orbit: 3rd stage ignition malfunction
Sputnik 3	1958 Δ2	USSR	May 15	Tyuratam	A	1,327	105.8	217	1,864	65.2	Decayed 4/6/60: variety of scientific data returned up to decay
Vanguard SLV 1	None	USN	May 27	ETR	Vanguard	9.8	–	–	–	–	Failed to orbit: improper 3rd stage trajectory
Luna	None	USSR	Jun 25	Tyuratam	A-1						Lunar probe; failed to orbit
Vanguard SLV 2	None	USN	Jun 26	ETR	Vanguard	9.8	–	–	–	–	Failed to orbit: premature 2nd stage cutoff
Explorer 4	1958 E1	ARPA	Jul 26	ETR	Jupiter C	8	110.1	263	2,213	50.1	Decayed 10/23/59: mapped project Argus radiation until 10-6-58
Thor-Able 1 (Pioneer)	None	USAF	Aug 17	ETR	Thor-Able	37.8	–	–	–	–	Lunar probe failed: initial lunar attempt, 1st stage malfunction
Explorer 5	None	ARPA	Aug 24	ETR	Jupiter C	17.1	–	–	–	–	Failed to orbit: upper stages fired in wrong direction
Luna	None	USSR	Sep 22*	Tyuratam	A-1						Lunar probe; failed to orbit

*May be Sep 24

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Vanguard SLV 3	None	USN	Sep 26	ETR	Vanguard	9.8	–	–	–	–	Failed to orbit: insufficient 2nd stage thrust
Pioneer 1	1958 H1	NASA	Oct 11	ETR	Thor-Able	37.8	–	–	70,717	–	Set distance record, failed to reach moon. Decayed 10/12/58
Beacon 1	None	NASA	Oct 23	ETR	Jupiter C	4	–	–	–	–	Failed to orbit: upper stages separated prior to burnout
Pioneer 2	None	NASA	Nov 8	ETR	Thor-Able	39.1	–	–	–	–	Lunar probe failed: 3rd stage ignition unsuccessful
Luna	None	USSR	Dec 4*	Tyuratam	A-1						Lunar probe; failed to orbit
Pioneer 3	1958 Ⓗ1	NASA	Dec 6	ETR	Juno II	5.88	–	–	63,580	–	Decayed 12/7/58: failed to reach Moon, provided radiation data
Score	1958 Ζ1	ARPA	Dec 18	ETR	Atlas B	70	101.5	184	1,484	32.3	Decayed 1/21/59: 1st commsat, tx taped messages for 13 days
Luna 1	1959 M1	USSR	Jan 2	Tyuratam	A-1	361	450 days	0.9766 AU	1.314 AU	0.01	In solar orbit: lunar probe, passed within 3,728 mi of Moon
Vanguard 2	1959 A1	NASA	Feb 17	ETR	Vanguard	9.8	124.1	559	3,142	32.9	In orbit: transmitted 18 days, satellite wobble degraded data
Discoverer 1	1959 B1	ARPA	Feb 28	WTR	Thor-Agena A	618	96.0	163	968	90.0	Decayed 3/5/59: 1st polar orbit, no reentry capsule
Pioneer 4	1959 N1	NASA	Mar 3	ETR	Juno II	5.88	398 days	0.9871 AU	1.142 AU	1.30	In solar orbit: lunar probe, passed within 37,300 mi of Moon
Discoverer 2	1959 Γ1	ARPA	Apr 13	WTR	Thor-Agena A	743	90.6	239	346	90.0	Decayed 4/26/59: capsule ejected on orbit 17, lost in Arctic
Vanguard SLV 5	None	NASA	Apr 13	ETR	Vanguard	10.3	–	–	–	–	Failed to orbit: 2nd stage damaged at separation
Discoverer 3	None	ARPA	Jun 3	WTR	Thor-Agena A	753	–	–	–	–	Failed to orbit: Agena fired, no satellite signals received
Luna	None	USSR	Jun 18	Tyuratam	A-1	–	–	–	–	–	Lunar probe; failed to orbit
Vanguard SLV 6	None	NASA	Jun 22	ETR	Vanguard	10.3	–	–	–	–	Failed to orbit: 2nd stage propulsion malfunction
Discoverer 4	None	ARPA	Jun 25	WTR	Thor-Agena A	743	–	–	–	–	Failed to orbit: insufficient 2nd stage velocity
Explorer S-1	None	NASA	Jul 16	ETR	Juno II	41.4	–	–	–	–	Failed to orbit: destroyed by range safety officer
Explorer 6	1959 Δ1	NASA	Aug 7	ETR	Thor-Able	64	768	245	42,400	47.0	Decayed before 7/61; 1st earth photo. rad. data to 10/6/59

*May be Nov 14

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Discoverer 5	1959 E1	ARPA	Aug 13	WTR	Thor-Agena A	781	94.1	217	739	80.0	Decayed 9/28/59: capsule orbited, decayed 2/11/61
Beacon 2	None	NASA	Aug 14	ETR	Juno II	4.5	–	–	–	–	Failed to orbit: 1st stage, upper stage malfunction
Discoverer 6	1959 Z1	ARPA	Aug 19	WTR	Thor-Agena	783	95.2	212	848	84.0	Decayed 10/20/59: capsule ejected orbit 17, recovery failed
Luna 2	1959 Ξ1	USSR	Sep 12	Tyuratam	A-1	387	Flight time: 34.0 hours				1st probe to impact moon, 9/15/59
Transit 1A	None	ARPA	Sep 17	ETR	Thor-Able	119	–	–	–	–	Failed to orbit: 3rd stage ignition malfunction
Vanguard 3	1959 H1	NASA	Sep 18	ETR	Vanguard	23	128.0	513	3,524	33.4	In orbit: radiation, micrometeoroid data until 12/11/59
Luna 3	1959 (H)1	USSR	Oct 4	Tyuratam	A-1	278.5	16.2 days	40,300	476,500	76.8	Decayed 4/29/60: photographed Moon's far side for 40 min
Explorer 7	1959 I1	NASA	Oct 13	ETR	Juno II	41.5	99.9	556	1,088	50.3	In orbit. Magnetic field, solar flare data until 8/24/61
Discoverer 7	1959 K1	ARPA	Nov 7	WTR	Thor-Agena A	794	94.6	99	554	1,087	Decayed 11/26/59. Poor stabilization, capsule not ejected
Discoverer 8	1959 A1	USAF	Nov 20	WTR	Thor-Agena A	795	103.7	187	1,679	80.6	Decayed 3/8/60. capsule overshot recovery area on orbit 15
Atlas-Able 4 (Pioneer)	None	NASA	Nov 26	ETR	Atlas-Able	168	–	–	–	–	Lunar probe failed: payload shroud broke away after 45 sec
Discoverer 9	None	USAF	Feb 4	WTR	Thor-Agena A	765	–	–	–	–	Failed to orbit: premature 1st stage cutoff
Discoverer 10	None	USAF	Feb 19	WTR	Thor-Agena A	765	–	–	–	–	Failed to orbit: destroyed by range safety officer
Midas 1	None	USAF	Feb 26	ETR	Atlas-Agena A	2,025	–	–	–	–	Failed to orbit: 2nd stage failed to separate. Missile Defense Alarm System
Pioneer 5	1960 A1	NASA	Mar 11	ETR	Thor-Able	43	312 days	0.8061 AU	0.995 AU	3.35	In solar orbit: solar system data to 22.5M mi until 6/26/60
Explorer S-46	None	NASA	Mar 23	ETR	Juno II	15.7	–	–	–	–	Failed to orbit: apparent upper stage ignition malfunction

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Tiros 1	1960 B2	NASA	Apr 1	ETR	Thor-Able	120	98.8	677	722	48.4	In orbit: TV and Infrared Observation Satellite, sent 22,952 photos up to 6/17/60
Luna 4	None	USSR	Apr 12	Tyuratam	A-1						Lunar probe; failed to orbit
Transit 1B	1960 Γ2	ARPA	Apr 13	ETR	Thor-Able Star	121	95.8	373	748	51.3	Decayed 10/5/67: initial navsat, transmitted until 7/12/60
Discoverer 11	1960 Δ1	USAF	Apr 15	WTR	Thor-Agena A	790	92.3	170	589	80.1	Decayed 4/26/60: capsule ejected orbit 17, recovery failed
Echo A-10	None	NASA	May 13	ETR	Delta	56.2	–	–	–	–	Failed to orbit: 2nd stage attitude control malfunction
Sputnik 4	1960 E1	USSR	May 15	Tyuratam	A-1	2,500	91.3	290	765	65.0	Decayed 9/5/62: Vostok prototype, deorbit failed 5/19/60 as cabin went higher orbit, cabin decayed 10-15-65
Midas 2	1960 Z1	USAF	May 24	ETR	Atlas-Agena A	2,300	94.4	484	511	33.0	Decayed 2/7/74: datalink quit 2nd day Missile Defense Alarm System
Transit 2A	1960 H1	USN	Jun 22	ETR	Thor-Able Star	101	101.2	603	1,018	66.7	In orbit: returned navigation, geodetic data until 8/62
Solrad 1	1960 H2	USN	Jun 22	ETR	Thor-Able Star	19	100.9	599	985	66.7	In orbit: 1st sub-satellite, returned solar radiation data until 4/61
Discoverer 12	None	USAF	Jun 29	WTR	Thor-Agena A	790	–	–	–	–	Failed to orbit: 2nd stage attitude instability
None	None	USSR	Jul 18	Tyuratam	A-1						Vostok precursor; failed to orbit
Discoverer 13	1960 Ⓗ1	USAF	Aug 10	WTR	Thor-Agena A	850	94.1	258	683	82.8	Decayed 11/14/60: 1st recovery from ocean on orbit 17
Echo 1	1960 I1	NASA	Aug 12	ETR	Delta	75.9	118.2	1,524	1,684	47.2	Decayed 5/24/68: 1st passive commsat, relayed voice, TV signals
Discoverer 14	1960 K1	USAF	Aug 18	WTR	Thor-Agena A	850	94.5	186	805	79.6	Decayed 9/16/60: 1st mid-air capsule recovery on orbit 17
Courier 1A	None	ARPA	Aug 18	ETR	Thor-Able Star	225	–	–	–	–	Failed to orbit: booster exploded 2.5 min after launch

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Sputnik 5	1960 Λ1	USSR	Aug 19	Tyuratam	A-1	1,440	90.7	297	324	65.0	Reentered 8/20/60: dogs Belka, Strelka recovered on orbit 18
Discoverer 15	1960 M1	USAF	Sep 13	WTR	Thor-Agena A	863	94.2	199	761	80.9	Decayed 10/18/60: capsule ejected 17th pass, lost in ocean
Atlas-Able 5 (Pioneer)	None	NASA	Sep 25	ETR	Atlas-Able	175	–	–	–	–	Lunar probe failed: 2nd stage oxidizer system malfunction. Pieces recovered in South Africa
Courier 1B	1960 N1	USA	Oct 4	ETR	Thor-Able Star	230	107.1	968	1,215	28.3	In orbit: 1st active-repeater commsat, operated for 17 days
None	None	USSR	Oct 10	Tyuratam	A-2-e	–	–	–	–	–	Mars probe failed, announced by U.S. in 1962
Samos 1	None	USAF	Oct 11	WTR	Atlas-Agena A	1,845	–	–	–	–	Failed to orbit: 2nd stage ignited but didn't reach orbit. Satellite and Missile Observation Satellite
None	None	USSR	Oct 14	Tyuratam	A-2-e	–	–	–	–	–	Mars probe failed: announced by U.S. in 1962
Discoverer 16	None	USAF	Oct 26	WTR	Thor-Agena B	1,091	–	–	–	–	Failed to orbit: 2nd stage, booster failed to separate
Explorer 8	1960 Ξ1	NASA	Nov 3	ETR	Juno II	41	106.3	407	1,699	49.9	In orbit: ionospheric research satellite, tx until 12/28/60
Discoverer 17	1960 O1	USAF	Nov 12	WTR	Thor-Agena B	1,091	96.4	190	984	81.9	Decayed 12/29/60: mid-air capsule recovery on orbit 31
Tiros 2	1960 Π1	NASA	Nov 23	ETR	Delta	130	97.4	585	667	48.5	In orbit: returned 36,156 cloud cover photos until 12/4/61
Transit 3A/ Solrad 2	None	USN	Nov 30	ETR	Thor-Able Star	91/18	–	–	–	–	Failed to orbit: destroyed by range safety officer. Pieces recovered in Cuba
Sputnik 6	1960 P1	USSR	Dec 1	Tyuratam	A-1	4,563	88.6	166	232	65.0	Decayed 12/2/60: recovery attempt failed, canine cabin lost
Explorer S-56	None	NASA	Dec 4	WI	Scout	6.3	–	–	–	–	Failed to orbit: 2nd stage ignition malfunction
Discoverer 18	1960 Σ1	USAF	Dec 7	WTR	Thor-Agena B	1,240	93.8	243	661	80.8	Decayed 4/2/61: mid-air capsule recovery on orbit 48
Atlas-Able 5B (Pioneer)	None	NASA	Dec 15	ETR	Atlas-Able	175	–	–	–	–	Lunar probe failed: exploded 70 seconds after lift off
Discoverer 19	1960 T1	USAF	Dec 20	WTR	Thor-Agena B	1,060	93.0	209	631	82.8	Decayed 1/23/61: infrared experiments, no reentry capsule

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	None	USSR	Dec 20	Tyuratam	A-1						Vostok precursor; failed to orbit. Cabin w/dogs recovered
Samos 2	1961 A1	USAF	Jan 31	WTR	Atlas-Agena A	1,900	95.0	474	557	97.0	Decayed 10/21/73: returned micrometeoroid impact data
Sputnik 7	1961 B1	USSR	Feb 4	Tyuratam	A-2-e	6,483	89.8	212	318	65.0	Decayed 2/26/61: believed to be Venus probe abort
Venera 1	1961 Γ1	USSR	Feb 12	Tyuratam	A-2-e	643.5	300 days	0.7183 AU	1.0190 AU	0.58	In solar orbit: Venus probe, radio contact lost at 4.7M mi
Sputnik 8	1961 Γ3	USSR	Feb 12	Tyuratam	A-2-e	6,424	89.7	123	198	65.0	Decayed 2/25/61: launched Venera 1 from parking orbit
Explorer 9	1961 Δ1	NASA	Feb 16	WI	Scout	6.6	118.3	634	2,583	38.6	Decayed 4/9/64: 12-ft balloon to study atmospheric density
Discoverer 20	1961 E1	USAF	Feb 17	WTR	Thor-Agena B	1,110	95.4	228	786	80.4	Decayed 7/28/62: programmer failure, no capsule ejection
Discoverer 21	1961 Z1	USAF	Feb 18	WTR	Thor-Agena B	1,110	93.8	240	1,069	80.7	Decayed 4/20/62: infrared experiments, no reentry capsule
Transit 3B/ Lofti 1	1961 H1	USN	Feb 22	ETR	Thor-Able Star	112/25	94.5	167	1,002	28.4	Decayed 3/30/61: 2nd stage, satellites failed to separate
Explorer S-45	None	NASA	Feb 24	ETR	Juno II	34	–	–	–	–	Failed to orbit: 3rd and 4th stage ignition malfunction
Sputnik 9	1961 (H)1	USSR	Mar 9	Tyuratam	A-1	4,700	88.5	173	239	64.9	Reentered 3/9/61: cabin with dog Chernushka recovered
Sputnik 10	1961 I1	USSR	Mar 25	Tyuratam	A-1	4,695	88.4	164	230	64.9	Reentered 3/25/61: dog Zvezdochka recovered after 1 orbit
Explorer 10	1961 K1	NASA	Mar 25	ETR	Delta	35	112 hrs	221	181,100	33.9	Decayed 6/68: magnetic field data for planned 60 hr
Discoverer 22	None	USAF	Mar 30	WTR	Thor-Agena B	1,150	–	–	–	–	Failed to orbit, 2nd stage control system malfunction
Discoverer 23	1961 Λ1	USAF	Apr 8	WTR	Thor-Agena B	1,150	101.2	295	651	81.9	Decayed 4/16/62: capsule orbited, decayed 5/23/62
Vostok	1961 M1	USSR	Apr 12	Tyuratam	A-1	4,725	89.1	169	315	65.0	Reentered 4/12/61: 1st manned space flight, cabin with Yuri Gagarin recovered in USSR after 1 orbit, 1.8 hr
Mercury-Atlas 3	None	NASA	Apr 25	ETR	Atlas D	900	–	–	–	–	Failed to orbit: destroyed by range safety officer
Explorer 11	1961 N1	NASA	Apr 27	ETR	Juno II	37	106.2	487	1,779	28.8	In orbit: gamma ray counter returned data until 12/6/61

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Mercury-Redstone 3	None	NASA	May 5	ETR	Redstone	1,280	Sub-orbital flight of 15 min, 22 sec				Recovered 5/5/61: 1st American in space, Alan Shepard reached an altitude of 116.5 mi, Freedom 7 capsule recovered 303.8 mi downrange
Explorer S-45A	None	NASA	May 24	ETR	Juno II	33	–	–	–	–	Failed to orbit: 2nd stage ignition malfunction
Discoverer 24	None	USAF	Jun 8	WTR	Thor-Agena B	1,150	–	–	–	–	Failed to orbit: 2nd stage ignition malfunction
Discoverer 25	1961 Ξ1	USAF	Jun 16	WTR	Thor-Agena B	1,150	90.9	222	409	82.1	Decayed 7/12/61: capsule recovered from ocean on orbit 33
Transit 4A	1961 O1	USN	Jun 29	ETR	Thor-Able Star	79	103.7	870	990	66.8	In orbit: 1st nuclear power supply, SNAP-3. Stage exploded, 215 pieces in orbit
Injun 1/ Solrad 3	1961 O2	USN	Jun 29	ETR	Thor-Able Star	25/16	103.7	872	994	66.8	In orbit: failed to separate, Injun sent radiation data until 3/6/63, Solrad returned solar X-ray data until late 1961
Explorer S-55	None	NASA	Jun 30	WI	Scout	84	–	–	–	–	Failed to orbit: 3rd stage ignition malfunction
Discoverer 26	1961 Π1	USAF	Jul 7	WTR	Thor-Agena B	1,150	95.0	228	808	82.9	Decayed 12/5/61: capsule recovered in mid-air on orbit 32
Tiros 3	1961 P1	NASA	Jul 12	ETR	Delta	129	100.2	730	801	47.9	In orbit: returned 35,033 photos up to 2/27/62
Midas 3	1961 Σ1	USAF	Jul 12	WTR	Atlas-Agena B	1,600	161.4	3,345	3,538	91.1	In orbit: 1st Midas launch from West Coast
Mercury-Redstone 4	None	NASA	Jul 21	ETR	Redstone	1,276	Sub-orbital flight of 15 min, 37 sec				Recovered 7/21/61: 2nd U.S. manned flight, Virgil Grissom reached an altitude of 118.3 mi. Liberty Bell 7 capsule not recovered
Discoverer 27	None	USAF	Jul 21	WTR	Thor-Agena B	1,150	–	–	–	–	Failed to orbit: destroyed by range safety officer
Discoverer 28	None	USAF	Aug 3	WTR	Thor-Agena B	1,150	–	–	–	–	Failed to orbit: 2nd stage control system malfunction
Vostok 2	1961 T1	USSR	Aug 6	Tyuratam	A-1	4,730	88.6	166	232	64.9	Reentered 8/7/61: Gherman Titov landed after 17 orbits, 25.3 hr

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			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Explorer 12	1961 γ1	NASA	Aug 16	ETR	Delta	38	1,585	790	76,620	33.3	Decayed 9/63: radiation and solar wind data until 12/6/61
Ranger 1	1961 Φ1	NASA	Aug 23	ETR	Atlas-Agena B	306	91.1	179	446	32.9	Decayed 8/30/61: attempt to reach deep space orbit failed
Explorer 13	1961 X1	NASA	Aug 25	WI	Scout	86	97.3	125	1,164	36.4	Decayed 8/28/61: micrometeoroid satellite, orbit too low
Discoverer 29	1961 Ψ1	USAF	Aug 30	WTR	Thor-Agena B	1,150	91.0	152	542	82.1	Decayed 9/10/61: capsule recovered from ocean on orbit 33
Samos 3	None	USAF	Sep 9	WTR	Atlas-Agena B	1,890	–	–	–	–	Exploded on launch pad
Discoverer 30	1961 ω1	USAF	Sep 12	WTR	Thor-Agena B	1,150	92.4	235	546	82.6	Decayed 12/11/61: capsule recovered in mid-air on orbit 33
Mercury Atlas 4	1961 AA1	NASA	Sep 13	ETR	Atlas D	1,200	88.6	156	248	32.6	Reentered 9/13/61: recovered from Atlantic after 1 orbit
Discoverer 31	1961 AB1	USAF	Sep 17	WTR	Thor-Agena B	1,150	91.0	235	396	82.7	Decayed 10/26/61: capsule separation failed
Discoverer 32	1961 AΓ1	USAF	Oct 13	WTR	Thor-Agena B	1,150	90.8	234	395	81.7	Decayed 11/13/61: mid-air capsule recovery on orbit 18
Midas 4	1961 AΔ1	USAF	Oct 21	WTR	Atlas-Agena B	1,800	165.9	3,485	3,760	91.2	In orbit: West Ford ejected but dipoles failed to disperse
Kosmos	None	USSR	Oct 21	Kapustin Yar	B-1						1st Kosmos; failed to orbit
Discoverer 33	None	USAF	Oct 23	WTR	Thor-Agena B	1,150	–	–	–	–	Failed to orbit: launch vehicle shut down prematurely
Mercury-Scout 1	None	NASA	Nov 1	ETR	Scout	67.5	–	–	–	–	Failed to orbit: destroyed by range safety officer
Discoverer 34	1961 AE1	USAF	Nov 5	WTR	Thor-Agena B	1,150	97.2	227	1,011	82.7	Decayed 12/7/62: malfunction prevented capsule ejection
Discoverer 35	1961 AZ1	USAF	Nov 15	WTR	Thor-Agena B	2,100	89.8	238	278	81.6	Decayed 12/3/61: capsule recovered in mid-air on orbit 18

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Transit 4B	1961 AH1	USN	Nov 15	ETR	Thor-Able Star	86	105.8	956	1,106	32.4	In orbit: tx'd until 7/62, SNAP 3 operated 8 mos.
Traac	1961 AH2	USN	Nov 15	ETR	Thor-Able Star	109	105.8	957	1,109	32.4	Transit Research and Attitude Control. In orbit.
Ranger 2	1961 AⒽ1	NASA	Nov 18	ETR	Atlas-Agena B	304	88.3	150	242	33.3	Decayed 11/20/61: attempt to reach deep space orbit failed
None	None	USAF	Nov 22	WTR	Atlas-Agena B	1,860	–	–	–	–	Failed to orbit
Mercury-Atlas 5	1961 AI1	NASA	Nov 29	ETR	Atlas D	1,300	88.5	158	237	32.5	Reentered 11/29/61: chimp Enos recovered after 2 orbits
None	None	USSR	Dec 11	Tyuratam	A-1						Failed to orbit
Discoverer 36	1961 AK1	USAF	Dec 12	WTR	Thor-Agena B	1,150	91.5	241	484	81.2	Decayed 3/8/62: capsule recovered in Pacific
Oscar 1	1961 AK2	USAF	Dec 12	WTR	Thor-Agena B	5	91.1	245	474	81.2	Orbiting Satellite Carrying Amateur Radio. 1st ham sat, tx'd 18 days. Decayed 1-31-62
None	None	USSR	Dec 21	Kapustin Yar	B-1						Failed to orbit
None	1961 AA1	USAF	Dec 22	WTR	Atlas-Agena B	1,860	94.5	244	702	89.6	Decayed 8/14/62
Discoverer 37	None	USAF	Jan 13	WTR	Thor-Agena B	1,150	–	–	–	–	Failed to orbit: malfunction following 2nd stage ignition
Composite 1	None	USN	Jan 24	ETR	Thor-Able Star	98.5	–	–	–	–	Failed to orbit: low 2nd stage thrust, carried 5 satellites
Ranger 3	1962 A1	NASA	Jan 26	ETR	Atlas-Agena B	327	406.4 days	0.9839 AU	1.163 AU	0.3988	In solar orbit: lunar probe, missed Moon by 22,862 mi
Tiros 4	1962 B1	NASA	Feb 8	ETR	Delta	129	100.1	712	840	48.3	In orbit: returned 32,593 cloud cover photos up to 6-10-62
Mercury-Atlas 6	1962 Γ1	NASA	Feb 20	ETR	Atlas D	1,352	88.5	159	265	32.5	Re-entered 2/20/62: 1st U.S. manned orbital mission John Glenn and "Friendship 7" recovered after 3 orbits, 4.9 hr

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			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1962 Δ1	USAF	Feb 21	WTR	Thor-Agena B	1,000	89.7	167	374	82.0	Decayed 3/4/62
Discoverer 38	1962 E1	USAF	Feb 27	WTR	Thor-Agena B	1,150	89.7	208	308	82.2	Decayed 3/21/62: capsule recovered in mid air after 65 orbits
OSO 1	1962 Z1	NASA	Mar 7	ETR	Delta	208	93.2	553	595	32.9	Decayed 10/8/81: Orbiting Solar Observatory transmitted data on 75 solar flares until 8/6/63
None	1962 H1	USAF	Mar 7	WTR	Atlas-Agena B	1,860	93.9	251	676	90.9	Decayed 6/7/63
Kosmos 1	1962 Ⓗ1	USSR	Mar 16	Kapustin Yar	B-1	315	96.4	135	204	967	Decayed 5/25/62: numerous scientific objectives announced as Kosmos research satellite series initiated
Kosmos 2	1962 I1	USSR	Apr 6	Kapustin Yar	B-1	285	102.5	215	1,488	49	Decayed 8/19/63: returned radiation belt, cosmic ray data
None	1962 K1	USAF	Apr 9	WTR	Atlas-Agena B	1,860	152.9	2,782	3,406	86.7	In orbit
None	1962 Λ1	USAF	Apr 18	WTR	Thor-Agena B	1,150	91.5	200	441	73.5	Decayed 5/28/62
Ranger 4	1962 M1	NASA	Apr 23	ETR	Atlas-Agena B	328	Flight time: 64.0 hours				Impacted on Moon: timer failure, experiments inoperative
Kosmos 3	1962 N1	USSR	Apr 24	Kapustin Yar	B-1	330	93.8	216	707	49.0	Decayed 10/17/62: returned radiation belt, cosmic ray data
Kosmos 4	1962 Ξ1	USSR	Apr 26	Tyuratam	A-1	4,600	90.6	285	317	65.0	Re-entered 4/29/62: 1st announced Kosmos recovery
Ariel 1	1962 O1	NASA/ UK	Apr 26	ETR	Delta	60	100.9	389	1,214	53.9	Decayed 5/24/76: Joint U.S./UK ionospheric satellite, tx'd ionospheric, X-ray, cosmic ray data until 11/64
Solrad 4B	None	USN	Apr 26	WTR	Scout	91	—	—	—	—	Failed to orbit: solar radiation
None	1962 Π1	USAF	Apr 26	WTR	Atlas-Agena B	1,588	88.6	203	204	92.0	Decayed 4/28/62
None	1962 P1	USAF	Apr 28	WTR	Thor-Agena B	1,150	91.1	180	475	73.2	Decayed 5/26/62

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Anna 1A	None	USN	May 10	ETR	Thor-Able Star	160	–	–	–	–	Failed to orbit: 2nd stage ignition malfunction. Army, Navy, NASA, Air Force joint satellite
None	1962 Σ1	USAF	May 15	WTR	Thor-Agena B	1,150	94.0	305	634	82.5	Decayed 11/26/63
None	None	USAF	May 23	WTR	Scout	91	–	–	–	–	Failed to orbit
Mercury-Atlas 7	1962 T1	NASA	May 24	ETR	Atlas D	1349	88.3	154	260	32.5	Reentered 5/24/62: Aurora 7 and Scott Carpenter recovered after 3 orbits, 4.9 hours; landed 250 mi. from target; splash-down in Atlantic
Kosmos 5	1962 γ1	USSR	May 28	Kapustin Yar	B-1	280	102.8	190	1,587	49.1	Decayed 5/2/63: monitored artificial radiation
None	1962 Φ1	USAF	May 30	WTR	Thor-Agena B	1,150	89.9	199	319	74.1	Decayed 6/11/62
None	1962 X1	USAF	Jun 2	WTR	Thor-Agena B	1,150	90.5	211	385	74.3	Decayed 6/28/62
Oscar 2	1962 X2	USAF	Jun 2	WTR	Thor-Agena B	10	90.5	207	394	74.3	Decayed 6/21/62: 2nd ham radio, tx'd 18 days
None	1962 Ψ1	USAF	Jun 17	WTR	Atlas-Agena B	1,860	–	–	–	–	Decayed 6/18/62
None	1962 Ω1	USAF	Jun 18	WTR	Thor-Agena B	1,500	92.3	370	411	82.0	Decayed 10/29/63
Tiros 5	1962 AA1	NASA	Jun 19	ETR	Delta	129	99.9	578	922	58.1	In orbit: returned 58,226 cloud cover photos until 5/4/63
None	1962 AB1	USAF	Jun 23	WTR	Thor-Agena B	1,150	89.0	213	293	75.1	Decayed 7/7/62
None	1962 AΓ1	USAF	Jun 28	WTR	Thor-Agena D	1,150	93.6	211	689	76.0	Decayed 9/14/62
Kosmos 6	1962 AΔ1	USSR	Jun 30	Kapustin Yar	B-1	355	90.6	264	344	49	Decayed 8/8/62
Telstar 1	1962 AE1	AT&T	Jul 10	ETR	Delta	77	157.8	936	5,653	44.8	In orbit: active-repeater commsat, tx'd until 2/21/63

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1962 AZ1	USAF	Jul 18	WTR	Atlas-Agena B	1,860	88.7	184	236	96.1	Decayed 7/25/62
None	1962 AH1	USAF	Jul 21	WTR	Thor-Agena B	1,150	90.0	208	381	70.3	Decayed 8/14/62
Mariner 1	None	NASA	Jul 22	ETR	Atlas-Agena B	200	–	–	–	–	Venus probe failed: destroyed by range safety officer
None	1962 AΘ1	USAF	Jul 28	WTR	Thor-Agena B	1,150	90.7	225	386	71.1	Decayed 8/24/62
Kosmos 7	1962 AI1	USSR	Jul 28	Tyuratam	A-1	4,600	90.1	197	356	6	Reentered 8/1/62: returned radiation data
None	1962 AK1	USAF	Aug 2	WTR	Thor-Agena D	1,150	90.2	204	418	82.3	Decayed 8/26/62
None	1962 AΛ1	USAF	Aug 5	WTR	Atlas-Agena B	1,860	88.6	205	205	96.3	Decayed 8/6/62
Vostok 3	1962 AM1	USSR	Aug 11	Tyuratam	A-1	4,722	88.5	166	218	65	Reentered 8/15/62: Andrian Nikolayev landed by parachute after 64 orbits, 94.4 hr; part of 1st Soviet dual launch flight
Vostok 4	1962 AN1	USSR	Aug 12	Tyuratam	A-1	4,728	88.5	169	222	65	Reentered 8/15/62: Pavel Popovich landed by parachute after 48 orbits, 71.0 hr; came within 3.1 mi of Vostok 3 on orbit 1
Kosmos 8	1962 Ξ1	USSR	Aug 18	Kapustin Yar	B-1	337	92.9	251	591	49	Decayed 8/17/63
None	1962 AO1	USAF	Aug 23	WTR	Scout	91	98.8	594	794	98.5	In orbit
None	1962 AΠ1	USSR	Aug 25	Tyuratam	A-2-e	890	88.7	168	221	64.9	Decayed 8/28/62: probable Venus probe failure
Mariner 2	1962 AP1	NASA	Aug 27	ETR	Atlas-Agena B	201	348 days	0.7046 AU	1,229 AU	1.66	In solar orbit 21,594 mi Venus flyby, data to 53.9M mi
None	1962 AΣ1	USAF	Aug 29	WTR	Thor-Agena D	1,150	90.4	187	400	65.2	Decayed 9/10/62
None	1962 AT1	USSR	Sep 1	Tyuratam	A-2-e	6,500	89.4	180	310	64.9	Decayed 9/6/62: probable Venus probe failure
None	1962 Aγ1	USAF	Sep 1	WTR	Thor-Agena B	1,150	94.4	300	669	82.2	Decayed 10/26/64

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1962 AΩ1	USSR	Sep 12	Tyuratam	A-2-e	6,500	88.4	186	213	64.9	Decayed 9/14/62: probable Venus probe failure
None/ERS 2	1962 AX1	USAF	Sep 17	WTR	Thor-Agena B	1,500	92.8	204	668	81.9	Decayed 11/16/62: Environmental Research Subsatellite failed to eject
Tiros 6	1962 AΨ1	NASA	Sep 18	ETR	Delta	127	98.2	686	713	58.3	In orbit: returned 66,674 cloud cover photos until 10/11/63
Kosmos 9	1962 AΩ1	USSR	Sep 27	Tyuratam	A-1	4,600	90.9	292	346	65	Reentered 10/1/62: returned radiation data
Alouette 1	1962 BA1	CAN	Sep 29	WTR	Thor-Agena B	145	105.3	991	1,025	80.5	In orbit: 1st Canadian, ionospheric data
None	1962 BB1	USAF	Sept 29	WTR	Thor-Agena D	91	90.3	203	376	65.4	Decayed 10/14/62
Explorer 14	1962 BΓ1	NASA	Oct 2	ETR	Delta	40	2,185	281	98,530	33.0*	In orbit: tx'd magnetosphere data until 10/8/63
Mercury-Atlas 8	1962 BΔ1	NASA	Oct 3	ETR	Atlas D	1,370	89.0	153	285	32.5	Reentered 10/3/62: Sigma 7 with Wally Schirra recovered within 5 mi. of carrier after 6 orbits, 9.2 hrs. Splashdown in Pacific
None	1962 BE1	USAF	Oct 9	WTR	Thor-Agena B	–	90.9	213	427	81.5	Decayed 11/16/62
Kosmos 10	1962 BZ1	USSR	Oct 17	Tyuratam	A-1	4,600	90.2	197	367	65.0	Reentered: returned radiation data
Ranger 5	1962 BH1	NASA	Oct 18	ETR	Atlas-Agena B	340	366 days	0.9490 AU	1.052 AU	0.3901	In solar orbit: lunar probe, missed Moon by 450 mi
Kosmos 11	1962 BⒽ1	USSR	Oct 20	Kapustin Yar	B-1	315	96.1	234	901	49.0	Decayed 5/18/64
None	1962 BI1	USSR	Oct 24	Tyuratam	A-2-e	6,500	91.8	180	485	64.8	Decayed 10/29/62: probable Mars probe failure. Exploded 10/29, 24 pieces
Starad	1962 BK1	USAF	Oct 26	WTR	Thor-Agena D	1,100	147.8	194	5,537	71.4	Decayed 10/5/67: Starfish artificial radiation data until 1/18/63
Explorer 15	1962 BΛ1	NASA	Oct 27	ETR	Delta	45	315.2	313	17,640	18.0*	Decayed 12/19/83. Tx'd radiation decay data until 2/9/63
Anna 1B	1962 BM1	USN	Oct 31	ETR	Thor-Able Star	161	107.9	1076	1182	50.1	In orbit: provided geodetic data
Mars 1	1962 BNU3	USSR	Nov 1	Tyuratam	A-2-e	893.5	519 days	0.9237 AU	1.604 AU	2.683	In solar orbit: Mars probe, lost earth lock at 65.9M mi

*Initial elements. Current elements not maintained

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1962 BΞ1	USSR	Nov 4	Tyuratam	A-2-e	890	88.7	–	–	64.7	Decayed 11/5/62: probable Mars probe failure
None	1962 BO1	USAF	Nov 5	WTR	Thor-Agena B	1,150	90.7	185	265	75.0	Decayed 12/3/62
None	1962 BΠ1	USAF	Nov 11	WTR	Atlas-Agena B	1,860	88.7	206	206	96.0	Decayed 11/12/62
None	1962 BP1	USAF	Nov 24	WTR	Thor-Agena B	1,150	89.8	204	310	65.2	Decayed 12/13/62
None	1962 BΣ1	USAF	Dec 4	WTR	Thor-Agena D	1,150	89.2	169	222	65.0	Decayed 12/8/62
None	1962 BT1	USAF/USN	Dec 13	WTR	Thor-Agena D	23	116.0	231	2,786	70.4	Decayed 2/9/67
Injun 3	1962 BT2	USAF/USN	Dec 13	WTR	Thor-Agena D	52	116.3	235	2,785	70.3	Decayed 8/25/63: tx'd radiation decay data until 11/3/63
None	1962 BT3	USAF/USN	Dec 13	WTR	Thor-Agena D	3	115.6	226	2,763	70.3	Decayed 7/1/63
None	1962 BT4	USAF/USN	Dec 13	WTR	Thor-Agena D	37	116.2	231	2,784	70.4	Decayed 1/18/66
None	1962 BT5	USAF/USN	Dec 13	WTR	Thor-Agena D	23	116.0	229	2,785	70.3	Decayed 2/5/67
Relay 1	1962 Bγ1	NASA	Dec 13	ETR	Delta	78	185.1	1,317	7,442	47.5	In orbit: commsat; experiments conducted until 2/65
None	1962 BΦ1	USAF	Dec 14	WTR	Thor-Agena D	1,150	90.5	199	392	70.0	Decayed 1/8/63
Explorer 16	1962 BX1	NASA	Dec 16	WI	Scout	100	104.2	747	1,166	52.0	In orbit: tx'd micrometeoroid data until 7/22/63
None/ERS 3&4	None	USAF	Dec 17	WTR	Atlas-Agena B	101/1/1	–	–	–	–	Failed to orbit: Environmental Research Subsatellites
Transit 5A	1962 BΨ1	USN	Dec 19	WTR	Scout	61	90	297	725	90.6	Decayed 9/25/86. Operational prototype, power failure 1st day
Kosmos 12	1962 Bω1	USSR	Dec 22	Tyuratam	A-1	4,730	90.5	198	392	65	Reentered 12/30/62: returned radiation data

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1963 1A*	USSR	Jan 4	Tyuratam	A-2-e	2,500	87.5	151	151	64.9	Decayed 1/5/63: probable lunar probe failure
None	1963 2A	USAF	Jan 7	WTR	Thor-Agena D	1,150	90.5	205	399	82.0	Decayed 1/24/63
None	1963 3A	USAF	Jan 16	WTR	Thor-Agena D	1,100	94.7	459	533	82.0	Decayed 1/9/69
Luna	None	USSR	Feb 2	Tyuratam	A-2-e						Lunar probe; failed to orbit
Syncom 1	1963 4A	NASA	Feb 14	ETR	Delta	39	1,425.5	34,392	36,739	33.3†	In orbit: communication lost at orbital injection
None	1963 5A	USAF	Feb 19	WTR	Scout	40	97.8	505	791	100.5	Decayed 12/26/79
None	None	USAF	Feb 28	WTR	TAT** Agena D	1,500	–	–	–		Failed to orbit: 1st Thrust Augmented Thor use
Luna	None	USSR	Mar 3	Tyuratam	A-2-e						Lunar probe; failed to orbit
None	None	USAF	Mar 18	WTR	TAT Agena D	1,500	–	–	–	–	Failed to orbit
Kosmos 13	1963 6A	USSR	Mar 21	Tyuratam	A-1	4,730	89.8	192	324	65.0	Reentered 3/29/63. Returned radiation data
None	1963 7A	USAF	Apr 1	WTR	Thor-Agena D	1,150	90.6	201	408	75.4	Decayed 4/26/63
Luna 4	1963 8A	USSR	Apr 2	Tyuratam	A-2-e	1,422		Barycentric orbit			In orbit. Lunar probe, missed Moon by 5,282 mi
Explorer 17	1963 9A	NASA	Apr 3	ETR	Delta	185	96.4	255	917	57.6	Decayed 11/24/66: atmospheric research data until 7/10/63
None	None	USAF	Apr 5	WTR	Scout	84	–	–	–	–	Failed to orbit
Kosmos 14	1963 10A	USSR	Apr 13	Kapustin Yar	B-1	–	92.1	252	499	49.0	Decayed 8/29/63
Kosmos 15	1963 11A	USSR	Apr 22	Tyuratam	A-1	4,730	89.8	160	358	65.0	Reentered 4/27/63: returned radiation data
None	None	USAF	Apr 26	WTR	Scout	40	–	–	–	–	Failed to orbit
None	None	USAF	Apr 26	WTR	Thor-Agena D	1,150	–	–	–	–	Failed to orbit
Kosmos 16	1963 12A	USSR	Apr 28	Tyuratam	A-1	4,730	90.4	194	388	65.0	Reentered 5/8/63: returned radiation data

*New international designation system initiated 1/1/63
**Thrust Augmented Thor
†Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Telstar 2	1963 13A	AT&T	May 7	ETR	Delta	79	225.3	966	10,808	42.7	In orbit: active-repeater commsat, tx'd until 5/65
None	1963 14A	USAF	May 9	WTR	Atlas Agena B	2,000	166.4	3,606	3,677	87.3	In orbit: ejected West Ford dipoles, comm tests successful. 100 objects tracked
ERS 5	1963 14B	USAF	May 9	WTR	Atlas Agena B	.67	165.9	2,927	4,317	87.6	In orbit: returned solar cell damage data for 92 days
ERS 6	1963 14C	USAF	May 9	WTR	Atlas Agena B	.67	166.4	3,607	3,675	87.3	In orbit: duplicate of ERS 5, returned data for 89 days
Mercury-Atlas 9	1963 15A	NASA	May 15	ETR	Atlas D	1,370	88.5	161	267	32.5	Reentered 5/16/63: Faith 7 with Gordon Cooper recovered after 22 orbits, 34.3 hr; completed Mercury program
None	1963 16A	USAF	May 18	WTR	TAT Agena D	1,500	91.1	153	497	74.5	Decayed 5/27/63
Kosmos 17	1963 17A	USSR	May 22	Kapustin Yar	B-1	322	94.8	260	788	49	Decayed 6/2/65
Kosmos 18	1963 18A	USSR	May 24	Tyuratam	A-1	4,730	89.4	196	288	65.0	Reentered 6/2/63: returned radiation data
None/ERS 7&8	None	USAF	Jun 12	WTR	Atlas Agena B	2,000/1/1	—	—	—	—	Failed to orbit
None	1963 19A	USAF	Jun 12	WTR	TAT Agena D	1,500	90.7	192	419	81.9	Decayed 7/11/63
Vostok 5	1963 20A	USSR	Jun 14	Tyuratam	A-1	4,720	88.4	162	209	65	Reentered 6/19/63: Valeri Bykovsky landed by parachute after 81 orbits, 119.1 hrs; part of 2nd dual-lanuch flight (see Vostok 6)
Lofti 2A	1963 21B	USAF/ USN	Jun 15	WTR	Thor Agena D	26	95.2	171	925	69.9	Decayed 7/18/63: VLF experiment
Solrad 6	1963 21C	USAF/ USN	Jun 15	WTR	Thor Agena D	39	95.1	155	590	69.9	Decayed 8/1/63: solar radiation
Radose	1963 21D	USAF/ USN	Jun 15	WTR	Thor Agena D	25	95.2	175	837	69.9	Decayed 7/30/63: radiation dosimeter payload

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1963 21E	USAF/ USN	Jun 15	WTR	Thor-Agena D	35	95.0	181	829	69.9	Decayed 7/27/63
Surcal 1B	1963 21F	USAF/ USN	Jun 15	WTR	Thor-Agena D	3	94.9	169	887	69.9	Decayed 7/5/63: surveillance calibration
None	1963 22A	USN	Jun 16	WTR	Scout	55	97.8	610	622	89.9	In orbit: gravity gradient stabilization system
Vostok 6	1963 23A	USSR	Jun 16	Tyuratam	A-1	4,713	88.3	168	218	65	Reentered 6/19/63: Valentina Tereshkova landed by parachute after 48 orbits, 70.8 hr; passed within 3 mi of Vostok 5
Tiros 7	1963 24A	NASA	Jun 19	ETR	Delta	135	95.9	548	572	58.2	In orbit: provided over 125,000 photos; deactivated 2/3/66
None	1963 25A	USAF	Jun 27	WTR	TAT-Agena D	1,500	90.5	196	396	81.6	Decayed 7/26/63
Hitch-hiker 1	1963 25B	USAF	Jun 27	WTR	TAT-Agena D	79.8	120.3	330	3,060	82.1	In orbit: returned radiation data for more than 3 months
Geophysical Research Satellite	1963 26A	USAF	Jun 28	WI	Scout	99.3	95.4	411	1,311	49.7	Decayed 12/14/83: space gas experiment data ceased after 13 orbits
None	1963 27A	USAF	Jun 29	WTR	TAT-Agena B	1,500	94.9	484	536	82.4	Decayed 10/26/69
None	None	USSR	Jul 3		A-2-e	–	–	–	–	–	Failed to orbit
None	1963 28A	USAF	Jul 12	WTR	Atlas-Agena D	2,000	88.2	164	164	95.4	Decayed 7/18/63: 100th Agena launched
None	1963 29A	USAF	Jul 18	WTR	Thor-Agena D	1,150	89.8	194	387	82.9	Decayed 8/13/63
None/ERS 10	1963 30A	USAF	Jul 18	WTR	Atlas-Agena B	2,000/1.5	167.8	3,680	3,717	88.4	In orbit: failed to eject Environmental Research Satellite
ERS 9	1963 30B	USAF	Jul 18	WTR	Atlas-Agena B	1.5	167.8	3,680	3,717	88.4	In orbit: returned radiation damage data for 111 days
None	1963 30D	USAF	Jul 18	WTR	Atlas-Agena B	1	167.4	3,665	3,745	88.4	Decayed 4/12/71

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Syncom 2	1963 31A	NASA	Jul 26	ETR	Delta	39	1,454.0	35,584	36,693	33.1°	In orbit
None	1963 32A	USAF	Jul 31	WTR	TAT Agena D	1,500	90.6	157	411	74.7	Decayed 8/11/63
Kosmos 19	1963 33A	USSR	Aug 6	Kapustin Yar	B-1	355	92.2	267	487	49	Decayed 3/30/64
None	1963 34A	USAF	Aug 24	WTR	TAT Agena D	1,500	90.5	161	320	75.0	Decayed 9/12/63
None	1963 35A	USAF	Aug 29	WTR	Thor Agena D	1,000	90.8	292	324	81.9	Decayed 11/7/63
None	1963 35B	USAF	Aug 29	WTR	Thor Agena D	–	92.0	310	431	81.9	Decayed 9/28/63
None	1963 36A	USAF	Sep 6	WTR	Atlas Agena D	2,000	89.1	168	263	94.4	Decayed 9/13/63
None	1963 37A	USAF	Sep 23	WTR	TAT Agena D	1,500	90.6	161	441	74.9	Decayed 10/12/63
None	None	USAF	Sep 27	WTR	Scout	40	–	–	–	–	Failed to orbit
None	1963 38A	USAF USN	Sep 28	WTR	Thor Able Star	–	107.0	1,069	1,104	89.8	In orbit
None	1963 38B	USAF USN	Sep 28	WTR	Thor Able Star	70	107.2	1,067	1,126	89.8	In orbit
None	1963 38C	USAF USN	Sep 28	WTR	Thor Able Star	61	107.2	1,066	1,124	89.8	In orbit: radiation satellite
Vela 1	1963 39A	USAF	Oct 17	ETR	Atlas Agena D	220	Current elements not maintained				In orbit
ERS 12	1963 39B	USAF	Oct 17	ETR	Atlas Agena D	2	2,329	220	103,500	36.8	Decayed 7/1/65
Vela 2	1963 39C	USAF	Oct 17	ETR	Atlas Agena D	220	Current elements not maintained				In orbit

*Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 20	1963 40A	USSR	Oct 18	Tyuratam	A-1	4,730	89.6	205	302	65	Reentered 10/28/63
Kosmos	None	USSR	Oct 24	Kapustin Yar	B-1						Failed to orbit
None	1963 41A	USAF	Oct 25	WTR	Atlas-Agena D	2,000	90.0	144	332	99.1	Decayed 10/29/63
None	1963 41B	USAF	Oct 25	WTR	Atlas-Agena D	–	88.7	136	297	99.1	Decayed 10/28/63
None	1963 42A	USAF	Oct 29	WTR	TAT-Agena D	1,500	90.9	279	345	89.9	Decayed 1/21/64
None	1963 42B	USAF	Oct 29	WTR	TAT-Agena D	60	93.4	285	585	89.9	Decayed 5/23/65
Polyot 1	1963 43A	USSR	Nov 1	Tyuratam	A-1-m	600	93.3	339	592	58.8	Decayed 10/16/82: 1st spacecraft with extensive maneuver capablity
None	None	USAF	Nov 9	WTR	Thor-Agena D	1,150	–	–	–	–	Failed to orbit
Kosmos 21	1963 44A	USSR	Nov 11	Tyuratam	A-2-e	890	88.5	182	216	64.8	Decayed 11/14/63
Kosmos 22	1963 45A	USSR	Nov 16	Tyuratam	A-1	4,780	90.3	192	381	64.9	Reentered 11/22/63
Explorer 18	1963 46A	NASA	Nov 27	ETR	Delta	62	96.3 hrs	192	197,616	33.3	Decayed 12/65: significant radiation data until 5/65 Interplanetary Monitoring Program (IMP A)
Atlas-Centaur 2	1963 47A	NASA	Nov 27	ETR	Atlas-Centaur	4,620	105.8	474	1,586	30.4	In orbit: AC 2 2nd stage, not considered a spacecraft
None	1963 48A	USAF	Nov 27	WTR	Thor-Agena D	1,150	90.1	175	386	70.0	Decayed 12/15/63
None	1963 49A	USAF	Dec 5	WTR	Thor-Able Star	–	106.7	1,060	1,085	90.0	In orbit
None	1963 49B	USAF/ USN	Dec 5	WTR	Thor-Able Star	75	107.0	1,060	1,114	90.0	In orbit: SNAP-9A power supply

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1963 49C	USAF/ USN	Dec 5	WTR	Thor Able Star	53	107.0	1,059	1,112	90.0	In orbit
Kosmos 23	1963 50A	USSR	Dec 13	Kapustin Yar	B-1	347	92.9	240	613	49	Decayed 3/27/64
None	1963 51A	USAF	Dec 18	WTR	Atlas Agena D	2,000	88.8	122	266	97.9	Decayed 12/20/63
Kosmos 24	1963 52A	USSR	Dec 19	Tyuratam	A-1	4,730	90.5	204	391	65	Reentered 12/28/63
Explorer 19	1963 53A	NASA	Dec 19	WTR	Scout	7	115.9	590	2,395	78.8	Decayed 5/10/81: 12-foot balloon identical to Explorer 9
Tiros 8	1963 54A	NASA	Dec 21	ETR	Delta	119	98.9	682	725	58.5	In orbit: returned over 100,000 photos; deactivated 7/1/67
None	1963 55A	USAF	Dec 21	WTR	TAT Agena D	1,500	89.3	176	355	64.9	Decayed 1/8/64
None	1963 55B	USAF	Dec 21	WTR	TAT Agena D	60	91.7	321	388	64.5	Decayed 11/7/64
None	1964 1A	USN/ USA	Jan 11	WTR	TAT Agena D	700	103.3	904	925	69.9	In orbit
GGSE 1	1964 1B	USN/ USA	Jan 11	WTR	TAT Agena D	39	103.3	902	924	69.9	In orbit: gravity gradient stabilization experiment
Secor 1	1964 1C	USN/ USA	Jan 11	WTR	TAT Agena D	18	103.3	903	926	69.9	In orbit: geodetic; pinpointed Pacific islands; deactivated
Solrad 7A	1964 1D	USN/ USA	Jan 11	WTR	TAT Agena D	45	103.3	902	926	69.9	In orbit: solar radiation; tx until 7/66
None	1964 1E	USN/ USA	Jan 11	WTR	TAT Agena D	–	103.3	903	926	69.9	In orbit
None	1964 2B	USAF	Jan 19	WTR	Thor Agena D	130	101.1	797	818	99.1	In orbit
None	1964 2C	USAF	Jan 19	WTR	Thor Agena D	130	101.1	797	822	99.1	In orbit
Relay 2	1964 3A	NASA	Jan 21	ETR	Delta	78	194.7	1,993	7,508	48.3	In orbit: commsat, experiments conducted until 9/26/65

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Echo 2	1964 4A	NASA	Jan 25	WTR	Thor Agena B	547	108.8	1,029	1,3116	81.5	Decayed 6/7/69: passive commsat, 1st joint program with USSR
Saturn SA-5	1964 5A	NASA	Jan 29	ETR	Saturn 1	17,100	94.8	264	7610	31.5	Decayed 4/30/66: 2nd stage, not considered a spacecraft
Elektron 1	1964 6A	USSR	Jan 30	Tyuratam	A-1	329	165.0	409	6,761	60.8	In orbit: studied inner Van Allen radiation belt
Elektron 2	1964 6B	USSR	Jan 30	Tyuratam	A-1	444	1,356.4	9,470	58,952	66.7	In orbit: studied outer belt; 1st dual payload Soviet launch
Ranger 6	1964 7A	NASA	Jan 30	ETR	Atlas Agena B	361.8	Flight time: 65.6 hours				Hit Moon. TV system malfunctioned, 2/2/64
None	1964 8A	USAF	Feb 15	WTR	TAT Agena D	1,590	90.9	179	444	75.1	Decayed 3/9/64
Molniya		USSR	Feb 19	Tyuratam	A-2-e						Failed to orbit
None	1964 9A	USAF	Feb 25	WTR	Atlas Agena D	2,000	88.2	173	1910	95.7	Decayed 3/1/64
Kosmos 25	1964 10A	USSR	Feb 27	Kapustin Yar	B-1	355	92.3	255	5216	49	Decayed 11/21/64
None	1964 11A	USAF	Feb 28	WTR	TAT Agena D	1,500	94.6	479	520	82.1	Decayed 2/19/69
None	1964 12A	USAF	Mar 11	WTR	Atlas Agena D	2,000	89.8	163	2013	95.8	Decayed 3/16/64
Kosmos 26	1964 13A	USSR	Mar 18	Kapustin Yar	B-1	365	91	266	3887	49	Decayed 9/28/64: radiation; new magnetometer
Beacon/ Explorer A	None	NASA	Mar 19	ETR	Delta	54	–	–	–	–	Failed to orbit: insufficient 3rd stage thrust (Explorer S-66)
Luna	None	USSR	Mar 21*	Tyuratam	A-2-e						Lunar probe; failed to orbit
None	None	USAF	Mar 24	WTR	TAT Agena D	1,500	–	–	–	–	Failed to orbit
Kosmos 27	1964 14A	USSR	Mar 27	Tyuratam	A-2-e	6,520	88.7	167	198	64.8	Decayed 3/28/64: probable Venus probe failure
Ariel 2	1964 15A	NASA/ UK	Mar 27	WI	Scout	68	101.3	180	843	51.6	Decayed 11/18/67: returned data from British experiments until 11/64

*May have been Feb 21

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Zond 1	1964 16D	USSR	Apr 2	Tyuratam	A-2-e	890		Heliocentric Orbit			Venus probe, failed to return planetary data
Kosmos 28	1964 17A	USSR	Apr 4	Tyuratam	A-1	4,730	90.4	213	373	65	Reentered 4/12/64
Gemini-Titan 1	1964 18A	NASA	Apr 8	ETR	Titan II	3,000	89.2	154	299	32.6	Decayed 4/12/64: boilerplate Gemini and 2nd stage
Polyot 2	1964 19B	USSR	Apr 12	Tyuratam	A-1-m	600	92.4	242	485	58.1	Decayed 6/8/66: carried out maneuvers 1st day in orbit
Luna	None	USSR	Apr 20	Tyuratam	A-2-e						Lunar probe; failed to orbit
None	None	USN	Apr 21	WTR	Thor Able Star	75	–	–	–	–	Failed to orbit: SNAP 9A power supply
None	1964 20A	USAF	Apr 23	WTR	Atlas Agena D	2,000	89.4	150	336	103.6	Decayed 4/28/64
Kosmos 29	1964 21A	USSR	Apr 25	Tyuratam	A-1	4,780	89.5	203	296	65.1	Reentered 5/3/64
None	1964 22A	USAF	Apr 27	WTR	TAT Agena D	1,500	90.8	178	446	80.0	Decayed 5/26/64
Kosmos 30	1964 23A	USSR	May 18	Tyuratam	A-1	4,730	90.2	206	366	64.9	Reentered 5/26/64
None	1964 24A	USAF	May 19	WTR	Atlas Agena D	2,000	89.7	141	380	101.1	Decayed 5/22/64
Saturn SA-6	1964 25A	NASA	May 28	ETR	Saturn I	16,900	88.5	179	204	31.8	Decayed 6/1/64: boilerplate Apollo modules and 2nd stage
None	1964 26A	USN	Jun 4	WTR	Scout	54	102.6	839	914	90.5	In orbit:
Luna	None	USSR	Jun 4*	Tyuratam	A-2-e	–	–	–	–	–	Lunar probe; failed to orbit
None	1964 27A	USAF	Jun 4	WTR	TAT Agena D	1,500	90.2	149	429	80.0	Decayed 6/18/64
Kosmos 31	1964 28A	USSR	Jun 6	Kapustin Yar	B-1	325	91.6	222	492	49	Decayed 10/20/64
Kosmos 32	1964 29A	USSR	Jun 10	Tyuratam	A-1	4,730	89.8	213	319	51.3	Reentered 6/18/64
None	1964 30A	USAF	Jun 13	WTR	TAT Agena D	1,500	91.7	350	364	115.0	Decayed 6/2/65: payload includes Star Flash experiment
None	1964 31A	USAF	Jun 18	WTR	Thor Agena D	130	101.4	818	827	99.8	In orbit

*May have been later, Jun 18

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1964 31B	USAF	Jun 18	WTR	Thor Agena D	130	101.4	819	829	99.8	In orbit
None	1964 32A	USAF	June 19	WTR	TAT Agena D	1,500	91.0	176	462	85.0	Decayed 7/16/64
Kosmos 33	1964 33A	USSR	Jun 23	Tyuratam	A-1	4,730	89.4	209	293	65	Reentered 7/1/64
Environmental Sciences Research Satellite	None	USAF	Jun 25	WTR	Scout	79.2	–	–	–	–	Failed to orbit: 2nd stage exploded
Atlas-Centaur 3	None	NASA	Jun 30	ETR	Atlas Centaur	4,815	–	–	–	–	Failed to orbit: Centaur flight test, not considered a spacecraft
Kosmos 34	1964 34A	USSR	Jul 1	Tyuratam	A-1	4,730	90	202	348	65	Reentered 7/9/64
None	1964 35A	USAF	Jul 2	WTR	TAT Agena D	1,500	94.9	501	529	82.1	Decayed 8/7/69
None	1964 36A	USAF	Jul 6	WTR	Atlas Agena D	2,000	89.4	121	346	92.9	Decayed 7/8/64
None	1964 36B	USAF	Jul 6	WTR	Atlas Agena D	60	90.9	297	377	93.0	Decayed 1/3/65
None	1964 37A	USAF	Jul 10	WTR	TAT Agena D	1,500	91.0	180	461	85.0	Decayed 8/6/64
Elektron 3	1964 38A	USSR	Jul 10	Tyuratam	A-1	350	163.4	405	6,638	60.8	In orbit: monitored inner Van Allen radiation belt
Elektron 4	1964 38B	USSR	Jul 10	Tyuratam	A-1	444	1,313.4	457	66,261	66.3	Decayed 10/12/83: simultaneously studied Van Allen outer belt magnetosphere
Kosmos 35	1964 39A	USSR	Jul 15	Tyuratam	A-1	4,730	89.2	218	258	51.3	Reentered 7/23/64
Vela 3	1964 40A	USAF	Jul 17	ETR	Atlas Agena D	220	Current elements not maintained				In orbit

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Vela 4	1964 40B	USAF	Jul 17	ETR	Atlas Agena D	220	Current elements not maintained				In orbit
ERS 13	1964 40C	USAF	Jul 17	ETR	Atlas Agena D	12	2,364	220	105,000	36.7	Decayed 7/1/66
Ranger 7	1964 41A	NASA	Jul 28	ETR	Atlas Agena D	362	Flight time: 68.6 hours				Crashed on moon: 1st Ranger success, returned 4,308 photos; tx until 7/31/64
Kosmos 36	1964 42A	USSR	Jul 30	Kapustin Yar	B-1	325	91.9	261	477	49	Decayed 2/28/65
None	1964 43A	USAF	Aug 5	WTR	TAT Agena D	1,540	90.5	182	436	80.0	Decayed 8/31/64
Kosmos 37	1964 44A	USSR	Aug 14	Tyuratam	A-1	4,730	89.5	207	287	65	Reentered 8/22/64
None	1964 45A	USAF	Aug 14	WTR	Atlas Agena D	2,000	89.0	149	307	95.5	Decayed 8/23/64
None	1964 45B	USAF	Aug 14	WTR	Atlas Agena D	79	127.4	275	3,748	95.6	Decayed 3/8/79: P-11 radiation
Kosmos 38	1964 46A	USSR	Aug 18	Tyuratam	C-1	50	95.2	206	769	56.2	Decayed 11/8/64: 1st Soviet triple payload launch
Kosmos 39	1964 46B	USSR	Aug 18	Tyuratam	C-1	50	95.2	206	798	56.2	Decayed 11/17/64
Kosmos 40	1964 46C	USSR	Aug 18	Tyuratam	C-1	50	95.2	206	740	56.2	Decayed 11/18/64
Syncom 3	1964 47A	NASA	Aug 19	ETR	TAD*	39	1,407.8	34,191	36,271	0.1**	In orbit
None	1964 48A	USAF	Aug 21	WTR	TAT Agena D	1,500	91.6	349	363	115.0	Decayed 3/31/65: payload included Star Flash experiment
Kosmos 41	1964 49D	USSR	Aug 22	Tyuratam	A-2-e	1,500	714.7	3,294	36,899	71.2	In orbit: investigated geomagnetically trapped protons
Kosmos 42	1964 50A	USSR	Aug 22	Kapustin Yar	B-1	100	97.8	230	1,113	49	Decayed 12/19/65: 1st double Kosmos launch
Kosmos 43	1964 50C	USSR	Aug 22	Kapustin Yar	B-1	100	97.8	227	1,100	49	Decayed 12/27/65
Explorer 20	1964 51A	NASA	Aug 25	WTR	Scout	44	103.7	859	1006	79.9	In orbit: returned ionospheric research data until 7/66
Nimbus 1	1964 52A	NASA	Aug 28	WTR	Thor Agena B	376	98.3	423	937	98.6	Decayed 5/16/74: 27,000 cloud cover photos returned until 9/23/64

*Thrust Augmented Delta
**Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 44	1964 53A	USSR	Aug 28	Tyuratam	A-1	3,800	99.0	604	813	65.1	In orbit: probable metsat
Transtage	None	USAF	Sep 1	ETR	Titan IIIA	1,700	–	–	–	–	Failed to orbit: Titan IIIA test, not considered a spacecraft
Orbiting Geophysical Observatory 1	1964 54A	NASA	Sep 5	ETR	Atlas-Agena B	487	38,388	281	149,385	31.2*	In orbit
Kosmos 45	1964 55A	USSR	Sep 13	Tyuratam	A-1	4,730	89.7	207	313	64.9	Reentered 9/18/64: weather research film capsule recovered
None	1964 56A	USAF	Sep 14	WTR	TAT-Agena D	1,330	90.8	172	466	85.0	Decayed 10/6/64
Saturn SA-7	1964 57A	NASA	Sep 18	ETR	Saturn I	16,700**	88.4	178	203	31.7	Decayed 9/22/64: boilerplate Apollo modules and 2nd stage
None	1964 58A	USAF	Sep 23	WTR	Atlas-Agena D	2,000	89.0	145	303	92.9	Decayed 9/28/64
Kosmos 46	1964 59A	USSR	Sep 24	Tyuratam	A-1	4,730	89.2	211	264	51.3	Reentered 10/2/64
Explorer 21	1964 60A	NASA	Oct 4	ETR	Delta	62	35 hrs	190	95,595	33.5	Decayed 1/66: apogee lower than planned, data until 10/13/65 (IMP B)
None	1964 61A	USAF	Oct 5	WTR	TAT-Agena D	1,500	90.4	182	440	80.0	Decayed 10/26/64
Kosmos 47	1964 62A	USSR	Oct 6	Tyuratam	A-2	5,320	90	174	383	64.8	Decayed 10/7/64: probable manned precursor
None	1964 63B	USAF/USN	Oct 6	WTR	Thor-Able Star	60	106.2	1,030	1,070	90.9	In orbit
None	1964 63C	USAF/USN	Oct 6	WTR	Thor-Able Star	1	106.0	1,017	1,050	89.9	In orbit
None	1964 63E	USAF/USN	Oct 6	WTR	Thor-Able Star	10	106.5	1,050	1,071	90.0	In orbit
None	None	USAF	Oct 8	WTR	Atlas-Agena D	2,000	–	–	–	–	Failed to orbit
Explorer 22	1964 64A	NASA	Oct 10	WTR	Scout	52	104.5	875	1,062	79.7	In orbit: ionospheric and geodetic data

*Initial elements

**Includes launch vehicle weight

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Voskhod 1	1964 65A	USSR	Oct 12	Tyuratam	A-2	5,320	90.1	177	377	65	Reentered 10/13/64: 1st 3-man crew—Vladimir Komarov, Konstantin Feoktistov, Boris Yegorov; landed after 16 orbits, 24.3 hours
Kosmos 48	1964 66A	USSR	Oct 14	Tyuratam	A-1	4,730	89.4	204	284	65.1	Reentered 10/20/64
None	1964 67A	USAF	Oct 17	WTR	TAT-Agena D	1,500	90.6	189	416	75.0	Decayed 11/4/64
None	1964 68A	USAF	Oct 23	WTR	Atlas-Agena D	2,000	88.6	139	271	95.6	Decayed 10/28/64
None	1964 68B	USAF	Oct 23	WTR	Atlas-Agena D	60	91.1	323	336	95.5	Decayed 2/23/65
Kosmos 49	1964 69A	USSR	Oct 24	Kapustin Yar	B-1	355	91.8	264	466	49	Decayed 8/21/65: measured earth's IR and UV radiation flux
Kosmos 50	1964 70A	USSR	Oct 28	Tyuratam	A-1	4,730	88.7	190	230	51.3	Decayed 11/5/64: exploded on 8th day in orbit, 97 pieces
None	1964 71A	USAF	Nov 2	WTR	TAT-Agena D	1,500	90.7	180	448	80.0	Decayed 11/28/64
None	1964 72A	USAF	Nov 4	WTR	TAT-Agena D	1,500	95.0	312	526	82.0	Decayed 11/5/69
Mariner 3	1964 73A	NASA	Nov 5	ETR	Atlas-Agena D	260	448.7 days	0.6150 AU	0.8155 AU	0.524	In solar orbit: shroud failure prevented Mars flyby
Explorer 23	1964 74A	NASA	Nov 6	WI	Scout	134	99.1	466	977	51.9	Decayed 6/9/83. 122 micrometeoroids recorded first year, tx until 7/66
None	1964 75A	USAF	Nov 18	WTR	TAT-Agena D	1,500	89.7	180	339	70.0	Decayed 12/6/64: included Orbiting Radio Beacon Ionospheric Satellite experiment
Explorer 24	1964 76A	NASA	Nov 21	WTR	Scout	8.6	116.3	525	2,498	81.4	Decayed 10/18/68: 12-foot balloon for atmospheric density studies
Explorer 25	1964 76B	NASA	Nov 21	WTR	Scout	40	115.2	524	2401	81.4	In orbit: radiation data until 12/66; 1st NASA dual-payload launch

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Mariner 4	1964 77A	NASA	Nov 28	ETR	Atlas-Agena D	260	567.2 days	Heliocentric orbit			Mars probe. Encountered micrometeoroids, tx ended 12/20/67
Zond 2	1964 78C	USSR	Nov 30	Tyuratam	A-2-e	890	Heliocentric Orbit				In solar orbit: Mars probe, failed to return planetary data
None	1964 79A	USAF	Dec 4	WTR	Atlas-Agena D	2,000	89.7	158	357	97.0	Decayed 12/5/64
Kosmos 51	1964 80A	USSR	Dec 9	Kapustin Yar	B-1	350	92.5	262	533	48.8	Decayed 11/14/65: measured luminosity of starry sky
Transtage	1964 81A	USAF	Dec 10	ETR	Titan IIIA	4,077	88	157	170	32.0	Decayed 12/13/64: Titan III test, not considered a spacecraft
Atlas-Centaur 4	1964 82A	NASA	Dec 11	ETR	Atlas-Centaur	2,944	87.9	165	178	30.6	Decayed 12/12/64: Centaur test, not considered a spacecraft
None	1964 83C	USAF/ USN	Dec 13	WTR	Thor-Able Star	78	106.1	1012	1071	89.8	In orbit: returned magnetic field, celestial field UV data
None	1964 83D	USAF/	Dec 13	WTR	Thor-Able Star	60	106.2	1019	1079	89.8	In orbit
San Marco 1	1964 84A	Italy	Dec 15	WI	Scout	254	94.9	198	846	37.8	Decayed 9/13/65: measured atmospheric density
None	1964 85A	USAF	Dec 19	WTR	TAT-Agena D	1,500	90.3	183	410	75.0	Decayed 1/14/65
Explorer 26	1964 86A	NASA	Dec 21	ETR	Delta	46	456.3	316	26,191	20.1*	In orbit
None	1964 87A	USAF	Dec 21	WTR	TAT-Agena D	–	89.4	238	264	70.1	Decayed 1/11/65
Kosmos 52	1965 1A	USSR	Jan 11	Tyuratam	A-1	4,730	89.5	203	298	65	Reentered 1/19/65
None	1965 2A	USAF	Jan 15	WTR	TAT-Agena D	1,500	90.5	180	420	75.0	Decayed 2/9/65
None	1965 3A	USAF	Jan 19	WTR	Thor-Altair	150	97.7	471	822	98.8	Decayed 7/13/79: 1st use of Thor-Altair
OV1 1	None	USAF	Jan 21	WTR	Atlas D	85	–	–	–	–	Orbiting vehicle launch from side pod of ABRES vehicle failed

*Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Tiros 9	1965 4A	NASA	Jan 22	ETR	Delta	138	119.0	702	2,568	96.4	In orbit: weather; turned off 2/15/67
None	1965 5A	USAF	Jan 23	WTR	Atlas-Agena D	2,000	88.9	146	291	102.5	Decayed 1/28/65
Kosmos 53	1965 6A	USSR	Jan 30	Kapustin Yar	B-1	310	98.7	218	1,180	48.8	Decayed 8/12/66
OSO 2	1965 7A	NASA	Feb 3	ETR	Delta	247	94.7	434	464	32.9	In orbit: Orbiting Solar Observatory; returned solar X-ray, gamma ray, UV data until 11/65
Titan IIIA3	1965 8A	USAF	Feb 11	ETR	Titan IIIA	3,700	145.4	2,767	2,796	32.1	Vehicle test
LES 1	1965 8C	USAF	Feb 11	ETR	Titan IIIA	31	145.8	2,783	2,803	32.1	In orbit: Lincoln Experimental Satellite; ejected after 3 Transtage burns
Kosmos	None	USSR	Feb 12	Kapustin Yar	B-1						Failed to orbit
Pegasus 1	1965 9A	NASA	Feb 16	ETR	Saturn I	10,400	97.0	495	733	31.7	Decayed 9/17/78: micrometeoroid; 2,300 sq ft of sensors; silenced 8/68
Ranger 8	1965 10A	NASA	Feb 17	ETR	Atlas-Agena B	366	Flight time: 64.9 hours				Hit moon 2/20/65 returned 7,137 closeup lunar photos
Kosmos 54	1965 11A	USSR	Feb 21	Tyuratam	C-1	50	106.2	256	1,729	56.1	Decayed 9/15/68: 2nd Soviet triple payload launch
Kosmos 55	1965 11B	USSR	Feb 21	Tyuratam	C-1	50	106.2	261	1,753	56.1	Decayed 2/2/68
Kosmos 56	1965 11C	USSR	Feb 21	Tyuratam	C-1	50	106.2	261	1,687	56.1	Decayed 11/2/67
Kosmos 57	1965 12A	USSR	Feb 22	Tyuratam	A-2	5,682	91.1	165	427	64.8	Decayed 2/22/65: exploded, probable manned precursor
None	1965 13A	USAF	Feb 25	WTR	TAT-Agena D	1,500	90.1	177	377	75.1	Decayed 3/18/65
Kosmos 58	1965 14A	USSR	Feb 26	Tyuratam	A-1	4,730	95.2	470	523	65.0	In orbit: probable metsat
Atlas-Centaur 5	None	NASA	Mar 2	ETR	Atlas-Centaur	951	—	—	—	—	Failed to orbit: Centaur flight test, not considered a spacecraft
Kosmos 59	1965 15A	USSR	Mar 7	Tyuratam	A-1	4,730	89.7	217	310	65	Reentered 3/15/65
GREB 6	1965 16A	USN/USA/USAF	Mar 9	WTR	Thor-Agena D	40	103.3	896	931	70.1	In orbit: first 8-payload launch

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
GGSE 2	1965 16B	USN/ USA/USAF	Mar 9	WTR	Thor-Agena D	4	103.3	898	932	70.1	In orbit: gravity gradient stabilization experiment
GGSE 3	1965 16C	USN/ USA/USAF	Mar 9	WTR	Thor-Agena D	4	103.2	891	926	70.1	In orbit: gravity gradient stabilization experiment
Solrad 7B	1965 16D	USN/ USA/USAF	Mar 9	WTR	Thor-Agena D	47	103.4	900	933	70.1	In orbit: solar radiation
Secor 3	1965 16E	USN/ USA/USAF	Mar 9	WTR	Thor-Agena D	18	103.3	898	932	70.1	In orbit: geodetic; deactivated
Oscar 3	1965 16F	USN/ USA/USAF	Mar 9	WTR	Thor-Agena D	14	103.1	884	917	70.1	In orbit: 3rd amateur "ham" radio, tx'd for 16 days - (EGRS-3)
Surcal	1965 16G	USN/ USA/USAF	Mar 9	WTR	Thor-Agena D	5	103.5	901	945	70.1	Decayed 3/27/81: surveillance calibration for Spasur system
Dodecahedron	1965 16H	USN/ USA/USAF	Mar 9	WTR	Thor-Agena D	4	103.4	898	935	70.1	In orbit: "Dodecahedron" surveillance calibration
None	1965 17A	USN/ USA	Mar 11	WTR	Thor-Able Star	60	95.1	211	890	89.9	Decayed 6/14/65
Secor 2	1965 17B	USN/ USA	Mar 11	WTR	Thor-Able Star	18	98.0	296	1,014	89.9	Decayed 2/26/68: geodetic; failed to operate as planned
Kosmos 60	1965 18A	USSR	Mar 12	Tyuratam	A-2-e	6,530	89.1	195	248	64.7	Decayed 3/17/65: probable lunar probe failure
None	1965 19A	USAF	Mar 12	WTR	Atlas-Agena D	2,000	88.8	93	155	247.6	Decayed 3/17/65
Kosmos 61	1965 20A	USSR	Mar 15	Tyuratam	C-1	50	106	262	1,738	56	Decayed 1/15/68: 3rd triple payload Kosmos launch
Kosmos 62	1965 20B	USSR	Mar 15	Tyuratam	C-1	50	106	257	1,715	56	Decayed 9/24/68
Kosmos 63	1965 20C	USSR	Mar 15	Tyuratam	C-1	50	106	262	1,672	56	Decayed 11/4/67
None	1965 21A	USAF	Mar 18	WTR	Thor-Altair	130	94.4	442	533	99.0	In orbit

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Voskhod 2	1965 22A	USSR	Mar 18	Tyuratam	A-2	5,682	90.9	167	475	65	Reentered 3/19/65: Alexei Leonov spent 20 min outside spacecraft; landed with Pavel Belyayev after 17 orbits, 26.0 hours
Ranger 9	1965 23A	NASA	Mar 21	ETR	Atlas-Agena B	366	Flight time: 64.5 hours				Hit moon 3/24/65. 5,814 photos, landed in crater Alphonsus
Gemini 3	1965 24A	NASA	Mar 23	ETR	Titan II	3,220	88.2	160	240	32.5	Reentered 3/23/65: 1st manned orbital maneuvers, Virgil Grissom, John Young landed after 3 orbits, 4.9 hours
Kosmos 64	1965 25A	USSR	Mar 25	Tyuratam	A-2	—	89.2	201	267	65	Reentered 4/2/65
None	1965 26A	USAF	Mar 25	WTR	TAT-Agena D	1,500	89.1	186	265	96.1	Decayed 4/4/65
Snapshot	1965 27A	USAF/USA	Apr 3	WTR	Atlas-Agena D	440	111.4	1,268	1,317	90.2	In orbit: SNAP-10A operated at more than 500w for 43 days. Since 1979, many objects separating
Secor 4	1965 27B	USAF/USA	Apr 3	WTR	Atlas-Agena D	40	111.4	1,282	1,313	90.3	In orbit: geodetic; failed to operate as planned
Early Bird (Intelsat I)	1965 28A	CSC*	Apr 6	ETR	TAD	39	1,437	35,003	36,606	0.1**	In orbit over Atlantic: commercial comm service began 6/28/65: switched off 1/69. Reactivated for temporary service 6/29/69; deactivated 8/13/69
Luna	None	USSR	Apr 10	Tyuratam	A-2-e						Lunar probe; failed to orbit
Kosmos 65	1965 29A	USSR	Apr 17	Tyuratam	A-1	4,730	89.8	207	319	65	Reentered 4/25/65: weather research film capsule recovered
Molniya 1A	1965 30A	USSR	Apr 23	Tyuratam	A-2-e	1,750	708	538	39,300	65	Decayed 8/16/79: 1st Soviet commsat, period adjusted to 12 hrs
None	1965 31A	USAF	Apr 28	WTR	Atlas-Agena D	2,000	88.7	180	259	95.7	Decayed 5/3/65
None	1965 31B	USAF	Apr 28	WTR	Atlas-Agena D	60	95.0	490	559	95.3	Decayed 10/31/69
Explorer 27	1965 32A	NASA	Apr 29	WI	Scout	59.7	107.8	933	1,315	41.2	In orbit: geodetic and ionospheric research; battery failed 1968

*Communications Satellite Corporation

**Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1965 33A	USAF	Apr 29	WTR	TAT-Agena D	1,500	91.0	178	473	85.0	Decayed 5/26/65
LES 2	1965 34B	USAF	May 6	ETR	Titan IIIA	37	309.9	2,799	14,802	32.2	In orbit: experimental commsat launched by last Titan IIIA
LCS 1	1965 34C	USAF	May 6	ETR	Titan IIIA	34	145.6	2,786	2,796	32.1	In orbit: passive aluminum sphere for radar calibration studies
Kosmos 66	1965 35A	USSR	May 7	Tyuratam	A-1	4,730	89.3	202	282	65	Reentered 5/15/65
Luna 5	1965 36A	USSR	May 9	Tyuratam	A-2-e	1,474		Flight time: 82.2 hours			Hit moon 5/12/65. 1st USSR soft landing attempt failed
None	1965 37A	USAF	May 18	WTR	TAT-Agena D	1,500	89.7	198	331	75.0	Decayed 6/15/65
None	1965 38A	USAF	May 20	WTR	Thor-Altair	130	98.7	527	829	98.2	In orbit
Pegasus 2	1965 39A	NASA	May 25	ETR	Saturn I	10,464	97.3	502	740	31.7	Decayed 11/3/79: meteoroid detection; silenced 8/68
Kosmos 67	1965 40A	USSR	May 25	Tyuratam	A-1	4,730	89.9	200	346	51.8	Reentered 6/2/65
None	1965 41A	USAF	May 27	WTR	Atlas-Agena D	2,000	88.7	149	267	95.8	Decayed 6/1/65
OV1 3	None	USAF	May 27	WTR	Atlas D	92	–	–	–	–	Failed to orbit: scientific satellite, launch vehicle exploded
Explorer 28	1965 42A	NASA	May 29	ETR	Delta	58.3	8550	190	264,000	33.9	Decayed 7/4/68: returned magnetic fields, radiation data (IMP C)
Gemini 4	1965 43A	NASA	Jun 3	ETR	Titan II	3,569	89.0	162	281	32.0	Reentered 6/7/65: Edward White performed 21-min EVA, landed with James McDivitt after 66 orbits, 97.9 hrs
Luna 6	1965 44A	USSR	Jun 8	Tyuratam	A-2-e	1,440		Heliocentric Orbit			Lunar soft lander, missed Moon by 100,000 mi
None	1965 45A	USAF	Jun 9	WTR	TAT-Agena D	1,500	89.9	176	362	75.1	Decayed 6/22/65
Kosmos 68	1965 46A	USSR	Jun 15	Tyuratam	A-1	4,730	89.8	209	315	65	Reentered 6/23/65
Transtage	1965 47A	USAF	Jun 18	ETR	Titan IIIC	9,694	88.1	167	193	32.2	Decayed 6/29/65: Titan IIIC test, not considered a spacecraft
None	1965 48A	USN	Jun 24	WTR	Thor-Able Star	61	106.7	1,016	1,131	89.9	In orbit: augmented operational navsat system

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 69	1965 49A	USSR	Jun 25	Tyuratam	A-1	4,730	89.7	212	305	65	Reentered 7/3/65
None	1965 50A	USAF	Jun 25	WTR	Atlas-Agena D	60	94.7	496	510	107.7	Decayed 8/22/68
None	1965 50B	USAF	Jun 25	WTR	Atlas-Agena D	2,000	88.8	151	283	107.6	Decayed 6/30/65
Tiros 10	1965 51A	NASA	Jul 2	ETR	Delta	127	100.3	728	817	98.4	In orbit: abandoned 7/3/67
Kosmos 70	1965 52A	USSR	Jul 2	Kapustin Yar	B-1	250	98.3	215	1,147	48.8	Decayed 12/18/66
None	None	USAF	Jul 12	WTR	Atlas-Agena D	2,000	–	–	–	–	Failed to orbit: destroyed by range safety officer
None	None	USSR	Jul 13	Tyuratam	A-1						Failed to orbit
Kosmos 71	1965 53A	USSR	Jul 16	Tyuratam	C-1	50	95.5	522	542	56.1	Decayed 8/11/70: 1st Soviet five-satellite payload launch
Kosmos 72	1965 53B	USSR	Jul 16	Tyuratam	C-1	50	95.5	538	588	56.1	Decayed 8/24/79
Kosmos 73	1965 53C	USSR	Jul 16	Tyuratam	C-1	50	95.5	538	556	56.1	Decayed 3/20/74
Kosmos 74	1965 53D	USSR	Jul 16	Tyuratam	C-1	50	95.5	338	616	56.1	Decayed 12/13/79
Kosmos 75	1965 53E	USSR	Jul 16	Tyuratam	C-1	50	95.5	540	644	56.1	Decayed 9/28/79
Proton 1	1965 54A	USSR	Jul 16	Tyuratam	D	12,200	92.5	183	589	63.5	Decayed 10/11/65: physics "lab," heaviest Soviet payload to date
None	1965 55A	USAF	Jul 16	WTR	TAT-Agena D	1,500	94.4	471	512	70.2	Decayed 12/18/68
Zond 3	1965 56A	USSR	Jul 18	Tyuratam	A-2-e	959	Heliocentric Orbit				Re-transmitted photos taken during lunar flyby
None	1965 57A	USAF	Jul 19	WTR	TAT-Agena D	1,500	90.9	182	464	85.1	Decayed 8/18/65
Vela 5	1965 58A	USAF	Jul 20	ETR	Atlas-Agena D	235	Current elements not maintained				In orbit: experimental nuclear test detection
Vela 6	1965 58B	USAF	Jul 20	ETR	Atlas-Agena D	235	Current elements not maintained				In orbit: lags Vela 5 by 180 degrees

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
ERS 17	1965 58C	USAF	Jul 20	ETR	Atlas-Agena D	5.4	2,608.8	153	112,694	34.4	Decayed 7/1/68: monitored radiation for 104 days
Kosmos 76	1965 59A	USSR	Jul 23	Kapustin Yar	B-1	325	92.2	256	513	48.8	Decayed 3/16/68
Pegasus 3	1965 60A	NASA	Jul 30	ETR	Saturn I	10,500	95.3	535	567	28.9	Decayed 8/4/69: meteoroid detection satellite, silenced 8/68
Kosmos 77	1965 61A	USSR	Aug 3	Tyuratam	A-1	4,730	89.3	201	280	51.8	Reentered 8/11/65
None	1965 62A	USAF	Aug 3	WTR	Atlas-Agena D	2,000	89.1	149	307	107.5	Decayed 8/7/65
None	1965 62B	USAF	Aug 3	WTR	Atlas-Agena D	60	94.7	501	515	107.4	Decayed 6/17/68
Secor 5	1965 63A	USA	Aug 10	WI	Scout	24	122.2	1,136	2,418	69.2	In orbit: Scout flight test carried geodetic
Atlas-Centaur 6	1965 64A	NASA	Aug 11	ETR	Atlas-Centaur	950	31 days		Barycentric Orbit		Surveyor model launched to simulated Moon
None	1965 65A	USN	Aug 13	WTR	Thor-Able Star	–	107.8	1,072	1,177	90.0	In orbit
Surcal	1965 65B	USN	Aug 13	WTR	Thor-Able Star	–	107.7	1,086	1,147	90.0	In orbit: failed to separate from 2nd stage; failed to deploy 200 ft antenna
Surcal	1965 65C	USN	Aug 13	WTR	Thor-Able Star	4	106.8	1,010	1,111	90.0	In orbit: "dodacahedron," extended twelve 25-ft antennas
Surcal	1965 65E	USN	Aug 13	WTR	Thor-Able Star	9	108.0	1,079	1,180	90.0	In orbit: "tempsat," 14-inch sphere painted dull black
None	1965 65F	USN	Aug 13	WTR	Thor-Able Star	61	108.0	1,077	1,186	90.0	In orbit: navigation; augmented USN system
Surcal	1965 65H	USN	Aug 13	WTR	Thor-Able Star	2	108.0	1,076	1,184	90.0	In orbit: 14-inch white sphere to check Spasur system
Surcal	1965 65L	USN	Aug 13	WTR	Thor-Able Star	–	108.0	1,079	1,189	90.0	In orbit: rectangular package with beacon transmitter
Kosmos 78	1965 66A	USSR	Aug 14	Tyuratam	A-1	4,730	89.9	218	298	69	Reentered 8/22/65

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1965 67A	USAF	Aug 17	WTR	TAT-Agena D	1,500	90.4	180	407	70.0	Decayed 10/11/65
Gemini 5	1965 68A	NASA	Aug 21	ETR	Titan II	3,600	89.5	197	303	32.6	Reentered 8/29/65: 1st extended U.S. manned flight, Gordon Cooper, Charles Conrad landed after 128 orbits, 190.9 hrs
REP	1965 68C	NASA	Aug 21	ETR	Titan II	34	89.2	168	314	32.6	Decayed 8/27/65: radar evaluation pod ejected from Gemini 5
Kosmos 79	1965 69A	USSR	Aug 25	Tyuratam	A-1	4,730	90	205	338	64.9	Reentered 9/2/65
OSO C	None	NASA	Aug 25	ETR	Delta	280	–	–	–	–	Failed to orbit: premature 3rd stage ignition
None	None	USAF	Sep 2	WTR	Thor-Agena D	1,150	–	-	–	–	Failed to orbit: destroyed by range safety officer
Kosmos 80	1965 70A	USSR	Sep 3	Tyuratam	C-1	50	115.0	1,366	1,540	56.1	In orbit: 2nd Kosmos five-payload launch
Kosmos 81	1965 70B	USSR	Sep 3	Tyuratam	C-1	50	115.3	1,392	1,547	56.1	In orbit
Kosmos 82	1965 70C	USSR	Sep 3	Tyuratam	C-1	50	115.7	1,415	1,554	56.1	In orbit
Kosmos 83	1965 70D	USSR	Sep 3	Tyuratam	C-1	50	116.0	1,443	1,561	56.1	In orbit
Kosmos 84	1965 70E	USSR	Sep 3	Tyuratam	C-1	50	116.4	1,469	1,569	56.1	In orbit
Kosmos 85	1965 71A	USSR	Sep 9	Tyuratam	A-1	4,730	89.6	204	297	65	Reentered 9/17/65
None	1965 72A	USAF	Sep 10	WTR	Thor-Altair	–	101.5	639	1,013	99.0	In orbit
Kosmos 86	1965 73A	USSR	Sep 18	Tyuratam	C-1	50	115.0	1,287	1,627	56.1	In orbit: 3rd Kosmos five-payload launch
Kosmos 87	1965 73B	USSR	Sep 18	Tyuratam	C-1	50	115.5	1,311	1,639	56.1	In orbit
Kosmos 88	1965 73C	USSR	Sep 18	Tyuratam	C-1	50	115.8	1,335	1,650	56.1	In orbit
Kosmos 89	1965 73D	USSR	Sep 18	Tyuratam	C-1	50	116.2	1,362	1,660	56.1	In orbit
Kosmos 90	1965 73E	USSR	Sep 18	Tyuratam	C-1	50	116.7	1,388	1,671	56.1	In orbit
None	1965 74A	USAF	Sep 22	WTR	TAT-Agena D	1,500	90.0	204	324	80.0	Decayed 10/11/65
Kosmos 91	1965 75A	USSR	Sep 23	Tyuratam	A-1	4,730	89.8	158	264	65	Reentered 10/1/65

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1965 76A	USAF	Sep 30	WTR	Atlas-Agena D	2,000	88.8	98	164	95.6	Decayed 10/5/65
Luna 7	1965 77A	USSR	Oct 4	Tyuratam	A-2-e	1,504	Flight time: 86.1 hours				Crashed on Moon 10/7/65: retros fired early, soft landing failed
OV1 2	1965 78A	USAF	Oct 5	WTR	Atlas D	86	121.5	409	2.995	144.3	In orbit: 1st successful OV1, returned radiation data
None	1965 79A	USAF	Oct 5	WTR	TAT-Agena D	1,500	89.8	203	323	75.1	Decayed 10/29/65
Molniya 1B	1965 80A	USSR	Oct 14	Tyuratam	A-2-e	1,750	719	481	39,935	65	Decayed 3/17/67: 2nd Soviet commsat, USSR-France comm link
OGO 2	1965 81A	NASA	Oct 14	WTR	TAT-Agena D	507	95.4	415	1,517	87.3	Decayed 9/17/81: geophysical, deactivated 2/68
OV2 1/LCS 2	1965 82A	USAF	Oct 15	ETR	Titan IIIC	170/34	99.7	706	792	32.6	Decayed 7/27/72: transtage broke up, failed to release payloads
Kosmos 92	1965 83A	USSR	Oct 16	Tyuratam	A-1	4,730	89.9	201	334	65	Reentered 10/24/65: weather research film capsule recovered
Kosmos 93	1965 84A	USSR	Oct 19	Kapustin Yar	B-1	305	91.7	216	513	48.4	Decayed 1/3/66
Gemini 6/Target	None	NASA	Oct 25	ETR	Atlas-Agena D	3,261	–	–	–	–	Failed to orbit: Agena exploded 6 min after launch
Kosmos 94	1965 85A	USSR	Oct 28	Tyuratam	A-1	4,730	89.3	205	271	65	Reentered 11/5/65
None	1965 86A	USAF	Oct 28	WTR	TAT-Agena D	1,500	90.6	176	430	75.0	Decayed 11/17/65
Proton 2	1965 87A	USSR	Nov 2	Tyuratam	D	12,200	92.6	189	608	63.5	Decayed 2/6/66: complex high-energy physics laboratory
Kosmos 95	1965 88A	USSR	Nov 4	Kapustin Yar	B-1	325	91.7	211	521	48.4	Decayed 1/18/66: payload broke up 3rd day in orbit
Explorer 29	1965 89A	NASA	Nov 6	ETR	TAD	175	120.3	1,114	2,273	59.4	In orbit: GEOS geodetic satellite; inactive
None	1965 90A	USAF	Nov 8	WTR	Atlas-Agena D	–	88.7	145	277	93.9	Decayed 11/11/65
None	1965 90B	USAF	Nov 8	WTR	Atlas-Agena D	2,000	88.9	155	284	93.9	Decayed 11/9/65
Venera 2	1965 91A	USSR	Nov 12	Tyuratam	A-2-e	962	Heliocentric Orbit				Passed Venus 2/27/66, failed to return data

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Venera 3	1965 92A	USSR	Nov 16	Tyuratam	A-2-e	958	Flight time: 105 days				Crashed on Venus 3/1/66: failed to return planetary data
Explorer 30	1965 93A	USN/ NASA	Nov 19	WI	Scout	57	100.5	680	877	59.7	In orbit: solar radiation; final IQSY monitor; inactive
Kosmos 96	1965 94A	USSR	Nov 23	Tyuratam	A-2-e	6,510	89.6	210	269	51.9	Decayed 12/9/65: suspected Venus probe left in parking orbit
Kosmos 97	1965 95A	USSR	Nov 26	Kapustin Yar	B-1	267	108.3	213	2,144	49	Decayed 4/2/67: payload included ammonia freq standard
A 1	1965 96A	France	Nov 26	Hammaguir	Diamant	42	108.1	530	1,736	34.3	In orbit: 1st French; tx'd for 2 days
Kosmos 98	1965 97A	USSR	Nov 27	Tyuratam	A-1	4,730	92	205	547	65	Reentered 12/5/65
Alouette 2	1965 98A	Canada	Nov 29	WTR	Thor-Agena B	145	119.8	503	2,800	79.8	In orbit: ionospheric research
Explorer 31	1965 98B	NASA	Nov 29	WTR	Thor-Agena B	99	120.7	502	2.906	79.8	In orbit: returned ionospheric data, complementing Alouette
Luna 8	1965 99A	USSR	Dec 3	Tyuratam	A-2-e	1,550	Flight time: 83.1 hours				Hit moon 12/6/65: retro-rockets fired late, soft landing failed
Gemini 7	1965 100A	NASA	Dec 4	ETR	Titan II	3,658	89.2	100	204	28.9	Reentered 12/18/65: Frank Borman, James Lovell went record 220 orbits, 330.6 hr; served as Gemini 6 rendezvous target
FR 1	1965 101A	France	Dec 6	WTR	Scout	60	99.3	717	728	75.9	In orbit: VLF wave propagation research; inactive
None	1965 102A	USAF	Dec 9	WTR	TAT-Agena D	1,500	90.5	183	437	80.0	Decayed 12/26/65
Kosmos 99	1965 103A	USSR	Dec 10	Tyuratam	A-1	4,730	89.6	203	309	65	Reentered 12/18/65
Gemini 6	1965 104A	NASA	Dec 15	ETR	Titan II	3,546	88.5	258	271	28.9	Reentered 12/16/65: Wally Schirra, Thomas Stafford rendezvoused within 1 ft of Gemini 7, landed after 17 orbits, 25.9 hrs
Pioneer 6	1965 105A	NASA	Dec 16	ETR	TAD	63.4	311.3 days	0.814 AU	0.985 AU	0.1695	In solar orbit: returning good data
Kosmos 100	1965 106A	USSR	Dec 17	Tyuratam	A-1	3,800	76.7	533	641	660	In orbit: probable metsat
Kosmos 101	1965 107A	USSR	Dec 21	Kapustin Yar	B-1	325	92.4	254	539	49	Decayed 7/12/66
OV2 3	1965 108A	USAF	Dec 21	ETR	Titan IIIC	193	589.2	167	33.662	26.3	Decayed 8/17/75: transtage separation failed

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
LES 4	1965 108B	USAF	Dec 21	ETR	Titan IIIC	52	589.2	189	33,632	26.6	Decayed 8/1/77: experimental all-solid-state commsat, tx in X-band
Oscar 4	1965 108C	USAF	Dec 21	ETR	Titan IIIC	13	587.4	162	33,561	26.8	Decayed 4/12/76: 4th amateur radio commsat
LES 3	1965 108D	USAF	Dec 21	ETR	Titan IIIC	16	581.4	195	33,177	26.4	Decayed 4/6/68: radio signal generator for commsat system tests
None	1965 109A	USN	Dec 21	WTR	Scout	60	104.8	898	1,066	99.1	In orbit
None	1965 110A	USAF	Dec 24	WTR	TAT-Agena D	1,500	90.7	178	446	80.0	Decayed 1/20/66
Kosmos 102	1965 111A	USSR	Dec 27	Tyuratam	A-1-m	4,700	89.2	203	269	65	Decayed 1/13/66
Kosmos 103	1965 112A	USSR	Dec 28	Tyuratam	C-1	875	95.2	474	495	56	In orbit: 52nd Kosmos orbited in 1965
None	None	USAF	Jan 6	WTR	Thor-Altair	130	–	–	–	–	Failed to orbit
Kosmos 104	1966 1A	USSR	Jan 7	Tyuratam	A-1	4,730	90.2	193	380	65	Reentered 1/15/66
None	1966 2A	USAF	Jan 19	WTR	Atlas-Agena D	2,000	88.7	150	269	93.9	Decayed 1/25/66
None	1966 2B	USAF	Jan 19	WTR	Atlas-Agena D	–	87.6	154	246	93.8	Decayed 1/23/66
Kosmos 105	1966 3A	USSR	Jan 22	Tyuratam	A-1	4,730	89.7	204	310	65	Reentered 1/30/66
Kosmos 106	1966 4A	USSR	Jan 25	Kapustin Yar	B-1	325	92.8	281	553	48.4	Decayed 11/14/66
None	1966 5A	USN	Jan 28	WTR	Scout	50	105.6	852	1,195	89.8	In orbit
Luna 9	1966 6A	USSR	Jan 31	Tyuratam	A-2-e	1,580	Flight time: 79.0 hours				Landed on Moon 2/3/66: returned photos of lunar surface for 3 days
None	1966 7A	USAF	Feb 2	WTR	TAT-Agena D	1,500	90.6	185	425	75.1	Decayed 2/27/66
ESSA 1	1966 8A	ESSA	Feb 3	ETR	Delta	138	100.0	689	818	97.9	In orbit: first operational Environmental Survey Satellite switched off 5/8/67
None	1966 9A	USAF	Feb 9	WTR	TAT-Agena D	1,500	94.8	508	512	82.1	Decayed 9/26/69

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 107	1966 10A	USSR	Feb 10	Tyuratam	A-1	4,730	89.7	204	310	65	Reentered 2/18/66
Kosmos 108	1966 11A	USSR	Feb 11	Kapustin Yar	B-1	355	95.3	219	855	48.9	Decayed 11/21/66
None	1966 12A	USAF	Feb 15	WTR	Atlas-Agena D	2,000	89.0	148	293	96.5	Decayed 2/22/66
None	1966 12B	USAF	Feb 15	WTR	Atlas-Agena D	9	88.1	115	253	96.5	Decayed 2/16/66
None	1966 12C	USAF	Feb 15	WTR	Atlas-Agena D	4	88.7	149	267	96.5	Decayed 2/22/66
D 1A	1966 13A	France	Feb 17	Hammaguir	Diamant	19	117.2	503	2,576	34.1	In orbit: 3rd French; geodetic data research
Kosmos 109	1966 14A	USSR	Feb 19	Tyuratam	A-1	4,730	89.5	202	295	65	Reentered 2/27/66
Kosmos 110	1966 15A	USSR	Feb 22	Tyuratam	A-2	5,700	95.3	190	882	51.9	Reentered 3/16/66: 2 dogs recovered after 330 orbits
ESSA 2	1966 16A	ESSA	Feb 28	ETR	TAD	132	113.4	1352	1,412	101.2	In orbit: completed initial ESSA global system, APT cameras
Kosmos 111	1966 17A	USSR	Mar 1	Tyuratam	A-2-e	6,540	88.6	182	194	51.9	Decayed 3/3/66: suspected lunar probe failure
None	1966 18A	USAF	Mar 9	WTR	TAT-Agena D	1,500	90.6	178	432	75.0	Decayed 3/29/66
Gemini 8/Target	1966 19A	NASA	Mar 16	ETR	Atlas-Agena D	3,175	90.4	285	298	28.9	Decayed 9/15/67: target vehicle for first docking in space
Gemini 8	1966 20A	NASA	Mar 16	ETR	Titan II	3,789	88.8	159	265	28.9	Docked w/ target 3/16. Short circuit forced early landing after 6.5 orbits, 10.7 hrs. Neil Armstrong, David Scott reentered 3/16/66
Kosmos 112	1966 21A	USSR	Mar 17	Plesetsk	A-1	4,730	92.1	207	545	72	Reentered 3/25/66: new USSR launch site
None	1966 22A	USAF	Mar 18	WTR	Atlas-Agena D	2,000	89.0	162	308	101.0	Decayed 3/24/66
None	1966 22B	USAF	Mar 18	WTR	Atlas-Agena D	–	88.2	152	284	100.9	Decayed 3/23/66
Kosmos 113	1966 23A	USSR	Mar 21	Tyuratam	A-1	4,730	89.6	207	313	65	Reentered 3/29/66
Proton	None	USSR	Mar 24	Tyuratam	D-1						Failed to orbit

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1966 24A	USN	Mar 26	WTR	Scout	50	105.1	885	1,104	89.9	In orbit
Molniya	None	USSR	Mar 27	Tyuratam	A-2-e						Failed to orbit
OV1 4	1966 25A	USAF	Mar 30	WTR	Atlas D	87.6	104.1	887	1,011	144.5	In orbit: returned zero-g, thermal control experiment data
OV1 5	1966 25B	USAF	Mar 30	WTR	Atlas D	114	105.6	987	1,058	144.6	In orbit: optical radiation test, gravity-gradient stabilized
None	1966 26A	USAF	Mar 30	WTR	Thor-Altair	130	99.9	613	883	98.5	In orbit
Luna 10	1966 27A	USSR	Mar 31	Tyuratam	A-2-e	1,597		Selenocentric Orbit			Lunar and circumlunar data until 5/30/66
Kosmos 114	1966 28A	USSR	Apr 6	Plesetsk	A-1	4,730	90.1	210	343	73	Reentered 4/14/66
None	1966 29A	USAF	Apr 7	WTR	TAT-Agena D	1,500	89.6	193	312	75.1	Decayed 4/26/66
Atlas-Centaur 8	1966 30A	NASA	Apr 7	ETR	Atlas-Centaur	784	89.6	175	334	30.8	Decayed 5/5/66: Centaur test, not considered a spacecraft
OAO 1	1966 31A	NASA	Apr 8	ETR	Atlas-Agena D	1,774	100.8	788	800	35.0	In orbit: Orbiting Astronomy Observatory battery failed second day in orbit
None	1966 32A	USAF	Apr 19	WTR	Atlas-Agena D	2,000	89.6	139	312	116.9	Decayed 4/26/66
Kosmos 115	1966 33A	USSR	Apr 20	Tyuratam	A-1	4,730	89.3	201	294	65	Reentered 4/28/66
OV3 1	1966 34A	USAF	Apr 22	WTR	Scout	69	138.7	341	4,658	82.4	In orbit: radiation research; deactivated
Molniya 1C	1966 35A	USSR	Apr 25	Tyuratam	A-2-e	1,750	710	506	39,492	64.5	Decayed 6/11/73: commsat, also tx'd cloud cover photos
Kosmos 116	1966 36A	USSR	Apr 26	Kapustin Yar	B-1	325	92	289	451	48.4	Decayed 12/3/66
Luna	None	USSR	Apr 30	Tyuratam	A-2-e						Lunar probe; failed to orbit
None	None	USAF	May 3	WTR	TAT-Agena D	1,500	–	–	–	–	Failed to orbit
Kosmos 117	1966 37A	USSR	May 6	Tyuratam	A-1	4,730	89.5	205	298	65	Reentered 5/14/66
Kosmos 118	1966 38A	USSR	May 11	Tyuratam	A-1	4,730	94.8	415	428	65	In orbit: probable metsat

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1966 39A	USAF	May 14	WTR	Atlas-Agena D	2,000	89.4	133	358	110.5	Decayed 5/21/66
None	1966 39B	USAF	May 14	WTR	Atlas-Agena D	60	95.4	517	559	109.9	Decayed 10/27/70
Nimbus 2	1966 40A	NASA	May 15	WTR	TAT-Agena B	414	108.0	1092	1,175	100.4	In orbit: returned TV, IR cloud cover photos; silenced 1/18/69
Gemini 9/ Target A	None	NASA	May 17	ETR	Atlas-Agena D	3,248	–	–	–		Failed to orbit: Atlas control system malfunction
Kosmos	None	USSR	May 17	Tyuratam	A-1	4,730					Failed to orbit
None	1966 41A	USN	May 19	WTR	Scout	50	103.1	843	959	89.9	In orbit
None	1966 42A	USAF	May 24	WTR	TAT-Agena D	1,500	89.0	179	271	66.0	Decayed 6/9/66
Kosmos 119	1966 43A	USSR	May 24	Kapustin Yar	B-1	250	99.8	208	1,292	48.5	Decayed 11/30/66
Explorer 32	1966 44A	NASA	May 25	ETR	Delta	225	99.3	289	2,716	64.5	Decayed 2/22/85. 6 aeronomy experiments returned data until 12/66
Surveyor 1	1966 45A	NASA	May 30	ETR	Atlas-Centaur	269	Flight time: 63.6 hours				Landed on Moon 6/2/66: tx'd 11,150 photos up to 7/13/66
Gemini 9/ Target B	1966 46A	NASA	Jun 1	ETR	Atlas D	794	90.4	292	296	28.9	Decayed 7/11/66: ATDA fairing separation failed
Gemini 9	1966 47A	NASA	Jun 3	ETR	Titan II	3,750	88.8	270	272	28.9	Reentered 6/6/66: rendezvous and EVA tests carried out by Thomas Stafford and Eugene Cernan; landed after 47 orbits, 72.3 hrs
None	1966 48A	USAF	Jun 3	WTR	Atlas-Agena D	2,000	88.4	143	288	86.9	Decayed 6/9/66
None	1966 48B	USAF	Jun 3	WTR	Atlas-Agena D	–	88.3	136	281	87.0	Decayed 6/9/66

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
OGO 3	1966 49A	NASA	Jun 7	ETR	Atlas-Agena B	634	2,915	319	122,173*	31.4	In orbit: 20 experiments returned geophysical data; deactivated
Kosmos 120	1966 50A	USSR	Jun 8	Tyuratam	A-1	4,730	89.4	205	285	51.8	Reentered 6/16/66
None	1966 51A	USAF/USA	Jun 9	WTR	Atlas-Agena D	2,000	124.8	174	3,616	90.1	Decayed 12/3/66
Secor 6	1966 51B	USAF/USA	Jun 9	WTR	Atlas-Agena D	17	125.1	168	3,648	90.1	Decayed 7/6/67: geodetic
ERS 16	1966 51C	USAF/USA	Jun 9	WTR	Atlas-Agena D	15	125.0	179	3,623	90.0	Decayed 3/12/67: carried 5 metal-to-metal bonding expmnts.
OV3 4	1966 52A	USAF	Jun 10	WI	Scout	78.5	143.0	647	4,711	40.9	In orbit: radiation research; deactivated
GGTS 1	1966 53A	USAF	Jun 16	ETR	Titan IIIC	47	Current elements not maintained				In orbit: gravity gradient test, 2 booms deployed
IDCSP 1	1966 53B	USAF	Jun 16	ETR	Titan IIIC	45	Current elements not maintained				In orbit: one of 7 operational-phase initial defense satcoms
IDCSP 2	1966 53C	USAF	Jun 16	ETR	Titan IIIC	45	Current elements not maintained				In orbit: initial defense satcom, all successfully separated
IDCSP 3	1966 53D	USAF	Jun 16	ETR	Titan IIIC	45	Current elements not maintained				In orbit: initial defense communications
IDCSP 4	1966 53E	USAF	Jun 16	ETR	Titan IIIC	45	Current elements not maintained				In orbit: initial defense communications
IDCSP 5	1966 53F	USAF	Jun 16	ETR	Titan IIIC	45	Current elements not maintained				In orbit: initial defense communications
IDCSP 6	1966 53G	USAF	Jun 16	ETR	Titan IIIC	45	Current elements not maintained				In orbit: initial defense communications
IDCSP 7	1966 53H	USAF	Jun 16	ETR	Titan IIIC	45	Current elements not maintained				In orbit: initial defense communications
Kosmos 121	1966 54A	USSR	Jun 17	Plesetsk	A-1	4,730	89.9	200	333	72.9	Reentered 6/25/66
None	1966 55A	USAF	Jun 21	WTR	TAT-Agena D	1,500	90.2	194	367	80.1	Decayed 7/14/66
Pageos	1966 56A	NASA	Jun 24	WTR	TAT-Agena D	55	180.5	4,038	4,201	85	In orbit: 100-ft balloon, photographed in geodetic study. Gradually broke up 1975-78
Kosmos 122	1966 57A	USSR	Jun 25	Tyuratam	A-1	4,730	94.3	469	495	65	In orbit: metsat, launch witnessed by Gen. de Gaulle
Explorer 33	1966 58A	NASA	Jul 1	ETR	TAD	93.3	23,148	30,532	494,236	29.0*	In orbit: excessive velocity prevented lunar orbit; active (IMP D)

*Initial elements

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Apollo 2 (AS-203)	1966 59A	NASA	Jul 5	ETR	Saturn IB	26,500	88.5	183	212	32.0	Decayed 7/5/66: S-IVB blown up, not considered a spacecraft
Proton 3	1966 60A	USSR	Jul 6	Tyuratam	D	12,200	92.5	185	585	63.5	Decayed 9/16/66: heavy weight research
Kosmos 123	1966 61A	USSR	Jul 8	Kapustin Yar	B-1	325	92.2	256	512	48.8	Decayed 12/10/66
None	1966 62A	USAF	Jul 12	WTR	Atlas-Agena D	2,000	88.7	137	236	95.5	Decayed 7/20/66
OV1 7	None	USAF	Jul 13	WTR	Atlas D	118	–	–	–	–	Failed to orbit: injection motor failed; 30-ft wire mesh sphere for passive commsat tests
OV1 8	1966 63A	USAF	Jul 14	WTR	Atlas D	10	105.2	998	1,013	144.2	Decayed 1/4/78
Kosmos 124	1966 64A	USSR	Jul 14	Tyuratam	A-1	4,730	89.4	205	286	51.8	Reentered 7/22/66
Gemini 10/ Target	1966 65A	NASA	Jul 18	ETR	Atlas-Agena D	3,175	90.4	290	296	28.9	Decayed 12/29/66: raised Gemini 10's apogee to 755 km
Gemini 10	1966 66A	NASA	Jul 18	ETR	Titan II	3,757	88.8	160	268	28.9	Docked w/ Gemini 10 target 7/19. EVA to Gemini 8 target 7/20. John Young, Michael Collins landed after 46 orbits, 70.8 hrs
Kosmos 125	1966 67A	USSR	Jul 20	Tyuratam	A-1-m	4,000	89.5	205	258	65	Reentered 8/2/66
Kosmos 126	1966 68A	USSR	Jul 28	Tyuratam	A-1	4,730	90	204	350	51.8	Reentered 8/6/66
None	1966 69A	USAF	Jul 29	WTR	Titan IIIB-Agena D	3,000	88.5	158	250	94.1	Decayed 8/6/66: 1st Titan IIIB launch
OV3 3	1966 70A	USAF	Aug 4	WTR	Scout	75	128.7	353	3,600	81.4	In orbit: radiation research; deactivated
Kosmos 127	1966 71A	USSR	Aug 8	Tyuratam	A-1	4,730	89.2	201	267	51.9	Reentered 8/16/66
None	1966 72A	USAF	Aug 9	WTR	Thorad-Agena D	1,500	89.4	194	287	100.1	Decayed 9/11/66: 1st Thorad launch
Lunar Orbiter 1	1966 73A	NASA	Aug 10	ETR	Atlas-Agena D	386					Returned lunar photos until 8/29. Crashed on moon 10/29/66
None	1966 74A	USAF	Aug 16	WTR	Atlas-Agena D	2,000	89.4	146	358	93.3	Decayed 8/24/66

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1966 74B	USAF	Aug 16	WTR	Atlas-Agena D	60	94.9	510	521	93.2	Decayed 3/5/70
Pioneer 7	1966 75A	NASA	Aug 17	ETR	TAD	63	402.9 days	1.010 AU	1.125 AU	0.097	In solar orbit: 6 solar and interplanetary experiments, active
None	1966 76A	USN	Aug 17	WTR	Scout	58	106.6	1,040	1,093	88.9	In orbit
None	1966 77A	USAF/ USA	Aug 19	WTR	Atlas-Agena D	2,000	167.4	3,659	3,707	89.9	In orbit
EGRS 7	1966 77B	USAF/ USA	Aug 19	WTR	Atlas-Agena D	17	167.5	3,673	3,697	89.8	In orbit: 1st of new geodetic series; deactivated
ERS 15	1966 77C	USAF/ USA	Aug 19	WTR	Atlas-Agena D	5	167.6	3,681	3,699	89.8	In orbit: 5 cold-welding experiments
Luna 11	1966 78A	USSR	Aug 24	Tyuratam	A-2-e	1,638		Selenocentric Orbit			Returned scientific data until 10/1/66
IDCSP	None	USAF	Aug 26	ETR	Titan IIIC	362	–	–	–	–	Failed to orbit: Titan IIIC malfunctioned, carried 8 IDCSP's
Kosmos 128	1966 79A	USSR	Aug 27	Tyuratam	A-1	4,730	90	213	319	65	Reentered 9/4/66
Gemini 11/ Target	1966 80A	NASA	Sep 12	ETR	Atlas-Agena D	3,175	90.4	298	298	28.8	Decayed 12/30/66: raised Gemini 11's apogee to 1,368 km
Gemini 11	1966 81A	NASA	Sep 12	ETR	Titan II	3,793	89.0	161	280	28.8	Docked w/ target 9/12. EVA. Reentered 9/15/66. Charles Conrad, Richard Gordon landed after 47 orbits, 71.3 hrs
None	1966 82A	USAF	Sep 16	WTR	Thor-Burner II	125	100.4	680	872	98.8	In orbit: initial use of Burner II
None	1966 83A	USAF	Sep 16	WTR	Atlas-Agena D	2,000	89.1	148	333	93.9	Decayed 9/23/66
None	1966 83B	USAF	Sep 16	WTR	Atlas-Agena D	160	94.2	460	501	94.0	Decayed 5/9/68
Kosmos		USSR	Sep 16	Tyuratam	A-1	4,730					Failed to orbit
Surveyor 2	1966 84A	NASA	Sep 20	ETR	Atlas-Centaur	292		Flight time: 62.8 hours			Crashed on Moon 9/23/66. Vernier failed

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1966 85A	USAF	Sep 20	WTR	TAT-Agena D	1,500	90.6	188	442	85.1	Decayed 10/12/66
Luna	None	USSR	Sep 25	Tyuratam	A-2-e						Lunar probe; failed to orbit
Lambda 4S 1	None	Japan	Sep 26	Kagoshima	Lambda 4S	26	–	–	–	–	Failed to orbit: 1st attempt to launch a Japanese test satellite
None	1966 86A	USAF	Sep 28	WTR	Titan IIIB-Agena D	3,000	88.8	151	296	94.0	Decayed 10/7/66
ESSA 3	1966 87A	ESSA	Oct 2	WTR	TAD	145	114.5	1,384	1,484	100.9	In orbit: replaced ESSA 1 in TOS system, silenced 10/9/68
None	1966 88A	USSR	Sep 17	Tyuratam	F-1-r	4,250	94.6	163	1,046	49.6	Decayed 11/11/66: 1st unannounced launch, payload exploded, 53 pieces
None	1966 89A	USAF	Oct 5	WTR	Atlas-Agena D	2,000	167.5	3,661	3,715	90.3	In orbit
EGRS 8	1966 89B	USAF	Oct 5	WTR	Atlas-Agena D	17	167.6	3,679	3,702	90.3	In orbit: geodetic; deactivated
None	1966 90A	USAF	Oct 12	WTR	Atlas-Agena D	2,000	88.6	155	287	91.0	Decayed 10/20/66
None	1966 90B	USAF	Oct 12	WTR	Atlas-Agena D	–	88.9	181	258	90.9	Decayed 10/21/66
Kosmos 129	1966 91A	USSR	Oct 14	Plesetsk	A-1	4,730	89.4	180	312	65	Reentered 10/21/66
Molniya 1D	1966 92A	USSR	Oct 20	Tyuratam	A-2-e	1,750	713	505	39,685	64.9	Decayed 9/11/68: 4th Russian commsat
Kosmos 130	1966 93A	USSR	Oct 20	Tyuratam	A-1	4,730	89.8	208	314	65	Reentered 10/28/66
Luna 12	1966 94A	USSR	Oct 22	Tyuratam	A-2-e	1,620		Selenocentric Orbit			Photographed Moon, returned scientific data
Atlas-Centaur 9	1966 95A	NASA	Oct 26	ETR	Atlas-Centaur	951	1593.3	166	406,200	29.6	Decayed 11/6/66: Centaur test, not considered a spacecraft
Intelsat 2A	1966 96A	CSC	Oct 26	ETR	TAD	140	718.4	3,161	37,244	17.9	Failed to achieve geosynchronous orbit due to apogee motor malfunction. Active but unusable in normal service
OV3 2	1966 97A	USAF	Oct 28	WTR	Scout	82	104.2	320	1,597	82.0	Decayed 9/29/71: radiation
None	1966 98A	USAF	Nov 2	WTR	Atlas-Agena D	2,000	88.9	159	305	91.0	Decayed 11/10/66

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1966 98B	USAF	Nov 2	WTR	Atlas-Agena D	–	89.6	206	324	91.0	Decayed 11/16/66
OV4 3	1966 99A	USAF	Nov 3	ETR	Titan IIIC	9,680	90.6	298	305	32.8	Decayed 1/9/67: modified Titan II tank carrying 9 experiments
OV4 1R	1966 99B	USAF	Nov 3	ETR	Titan IIIC	136	90.4	291	298	32.8	Decayed 1/5/67: receiver for "whispering gallery" experiments
OV1 6	1966 99C	USAF	Nov 3	ETR	Titan IIIC	202	90.4	290	295	32.8	Decayed 12/31/66
OV4 1T	1966 99D	USAF	Nov 3	ETR	Titan IIIC	109	90.7	294	321	32.8	Decayed 1/11/67: transmitter for "whispering gallery" test
Luna Orbiter 2	1966 100A	NASA	Nov 6	ETR	Atlas-Agena D	390					Hit moon 10/11/67: returned 205 lunar frames
None	1966 101A*	USSR	Nov 2	Tyuratam	F-1-r	4,400	94.6	140	855	49.6	Decayed 11/29/66: 2nd unannounced launch, payload exploded, 41 pieces
None	1966 102A	USAF	Nov 8	WTR	TAT-Agena D	1,500	89.4	172	318	100.1	Decayed 11/29/66
Gemini 12/ Target	1966 103A	NASA	Nov 11	ETR	Atlas-Agena D	3,175	90.4	243	310	28.9	Decayed 12/23/66: positioned Gemini 12 for solar eclipse photo
Gemini 12	1966 104A	NASA	Nov 11	ETR	Titan II	3,655	89.0	243	310	28.9	Docked w/ target 11/12. Reentered 11/15/66 after 63 orbits, 94.6 hrs. James Lovell, Edwin Aldrin conducted successful EVA tests
Kosmos 131	1966 105A	USSR	Nov 12	Plesetsk	A-1	4,730	89.9	206	326	72.9	Reentered 11/20/66
Kosmos	None	USSR	Nov 16	Tyuratam	C-1						Failed to orbit
Kosmos 132	1966 106A	USSR	Nov 19	Tyuratam	A-1	4,730	89.3	210	276	65	Reentered 11/27/66
Kosmos 133	1966 107A	USSR	Nov 28	Tyuratam	A-2	6,450	88.4	171	223	51.9	Reentered 11/30/66: believed to be Soyuz precursor
Kosmos 134	1966 108A	USSR	Dec 3	Tyuratam	A-1	4,730	89.6	201	294	65	Reentered 12/11/66
None	1966 109A	USAF	Dec 5	WTR	Atlas-Agena D	2,000	89.7	137	388	104.6	Decayed 12/14/66
ATS 1	1966 110A	NASA	Dec 7	ETR	Atlas-Agena D	352	1,435.0	35,734	35,797	10.5	In orbit: Applications Technology Satellite. communication and meteorological tests
OV1 9	1966 111A	USAF	Dec 11	WTR	Atlas D	230	141.0	472	4,694	99.1	In orbit: radiation; studied bio-hazards; deactivated

*Int'l designation number assigned later

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
OV1 10	1966 111B	USAF	Dec 11	WTR	Atlas D	130	97.8	594	686	93.4	In orbit: gravity-stabilized, radiation; deactivated
Kosmos 135	1966 112A	USSR	Dec 12	Kapustin Yar	B-1	355	93.5	253	649	48.5	Decayed 4/12/67
None	1966 113A	USAF	Dec 14	WTR	Titan IIIB-Agena D	3,000	89.5	138	368	109.5	Decayed 12/24/66
Biosatellite 1	1966 114A	NASA	Dec 14	ETR	TAD	425	90.7	295	309	33.5	Decayed 2/15/67: failed to return biological capsule
Kosmos 136	1966 115A	USSR	Dec 19	Plesetsk	A-1	4,730	89.4	188	280	64.6	Reentered 12/27/66
Lambda 4S 2	None	Japan	Dec 20	Kagoshima	Lambda 4S	58	–	–	–	–	Failed to orbit: 2nd attempt test satellite; 4th stage ignition did not ignite
Luna 13	1966 116A	USSR	Dec 21	Tyuratam	A-2-e	1,700	Flight time: 79.7 hours				Landed on moon 12/24/66: returned photos, soil density data
Kosmos 137	1966 117A	USSR	Dec 21	Kapustin Yar	B-1	295	104.3	219	1,718	48.8	Decayed 11/23/67
None	1966 118A	USAF	Dec 29	WTR	TAT-Agena D	1,500	94.4	486	497	74.0	Decayed 4/5/69
Intelsat 2B (Pacific 1)	1967 1A	CSC	Jan 11	ETR	TAD	87	1,330	33,600	33,900	0.1*	In orbit: trans-Pacific comm service began 1/27/67
None	1967 2A	USAF	Jan 14	WTR	TAT-Agena D	1,500	90.0	180	380	80.1	Decayed 2/2/67
IDCSP 8 - 15	1967 3A - 1967 3H	USAF	Jan 18	ETR	Titan IIIC	45 ea	Current elements not maintained				In orbit: 2nd successful multiple launch of initial defense communications satellites
Kosmos 138	1967 4A	USSR	Jan 19	Plesetsk	A-1	4,730	89.2	191	273	65	Reentered 1/27/67
Kosmos 139	1967 5A	USSR	Jan 25	Tyuratam	F-1-r	5,000	87.5	144	210	50	Reentered 1/25/67: FOBS flight test
ESSA 4	1967 6A	ESSA	Jan 26	WTR	TAD	132	113.4	1,324	1,437	102.0	In orbit: replaced ESSA 2, camera failure caused deactivation 12/6/67
OV3 5	None	USAF	Jan 31	WTR	Scout	94	–	–	–	–	Failed to orbit: atmospheric research
None	1967 7A	USAF	Feb 2	WTR	Atlas-Agena D	2,000	88.8	136	357	102.4	Decayed 2/12/67
Lunar Orbiter 3	1967 8A	NASA	Feb 5	ETR	Atlas-Agena D	385					Hit moon 10/9/67. Returned 182 lunar frames

*Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 140	1967 9A	USSR	Feb 7	Tyuratam	A-2	6,450	88.5	165	218	51.7	Reentered 2/9/67: believed to be Soyuz precursor
None	1967 10A	USAF	Feb 8	WTR	Thor-Burner II	250	101.3	778	854	98.9	In orbit
Diademe 1	1967 11A	France	Feb 8	Hammaguir	Diamant	23	102.9	557	1,198	40.0	In orbit: geodetic; operational in spite of low apogee
Kosmos 141	1967 12A	USSR	Feb 8	Plesetsk	A-1	4,730	89.8	205	316	72.9	Reentered 2/16/67
Kosmos 142	1967 13A	USSR	Feb 14	Kapustin Yar	B-1	315	100.3	207	1,336	48.4	Decayed 7/6/67
Diademe 2	1967 14A	France	Feb 15	Hammaguir	Diamant	23	109.4	589	1,790	39.4	In orbit: provided good laser, doppler data until 4/5/67
None	1967 15A	USAF	Feb 22	WTR	TAT-Agena D	1,500	90.1	180	380	80.0	Decayed 3/11/67
None	1967 16A	USAF	Feb 24	WTR	Titan IIIB-Agena D	3,000	89.8	135	414	107.0	Decayed 3/6/67
Kosmos 143	1967 17A	USSR	Feb 27	Tyuratam	A-1	1,730	89.5	204	297	65	Reentered 3/7/67
Kosmos 144	1967 18A	USSR	Feb 28	Plesetsk	A-1	4,730	93.2	574	644	81.2	Decayed 9/14/82. meteorological; similar to Kosmos 122
Kosmos 145	1967 19A	USSR	Mar 3	Kapustin Yar	B-1	250	108.6	215	2,116	48.4	Decayed 3/8/68
OSO 3	1967 20A	NASA	Mar 8	ETR	Delta	627	91.4	534	564	32.9	Decayed 4/4/82: Orbiting Solar Observatory, 9 experiments
Kosmos 146	1967 21A	USSR	Mar 10	Tyuratam	D-1-e	5,375	89.2	177	296	51.5	Reentered 3/18/67: believed to be manned precursor
Kosmos 147	1967 22A	USSR	Mar 13	Plesetsk	A-1	4,730	89.5	195	301	65	Reentered 3/21/67
Kosmos 148	1967 23A	USSR	Mar 16	Plesetsk	B-1	325	91.3	270	404	71	Decayed 5/7/67
Kosmos 149	1967 24A	USSR	Mar 21	Kapustin Yar	B-1	375	89.8	245	285	48.4	Decayed 4/7/67: earth-oriented metsat
Kosmos 150	1967 25A	USSR	Mar 22	Plesetsk	A-1	4,730	90.1	204	350	65.7	Reentered 3/30/67
Intelsat 2C (Atlantic 2)	1967 26A	CSC	Mar 23	ETR	TAD	192	1,434	35,687	35,771	1.4*	In orbit over Atlantic. 3rd Intelsat 2; comm service began 4/7/67
Kosmos 151	1967 27A	USSR	Mar 24	Tyuratam	C-1	875	95.7	508	540	56.1	In orbit
Kosmos 152	1967 28A	USSR	Mar 25	Plesetsk	B-1	325	92.2	272	488	71	Decayed 8/5/67
None	1967 29A	USAF	Mar 30	WTR	TAT-Agena D	1,500	90.1	167	326	85.0	Decayed 4/17/67

*Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 153	1967 30A	USSR	Apr 4	Plesetsk	A-1	4,730	89.3	199	279	64.6	Reentered 4/12/67
ATS 2	1967 31A	NASA	Apr 6	ETR	Atlas-Agena D	370	218.9	178	11,124	28.4	Decayed 9/2/69 elliptical orbit prevented gravity gradient test
Kosmos 154	1967 32A	USSR	Apr 8	Tyuratam	D-1	5,375	88.5	183	223	51.6	Reentered 4/10/67: believed to be manned precursor
Kosmos 155	1967 33A	USSR	Apr 12	Tyuratam	A-1	4,730	89.2	193	272	51.8	Reentered 4/20/67
None	1967 34A	USN	Apr 13	WTR	Scout	60	106.3	1,038	1,070	90.3	In orbit
Lambda 4S 3	None	Japan	Apr 13	Kagoshima	Lambda 4S	26	–	–	–	–	Failed to orbit: Japan's 3rd attempt to orbit test satellite (4th stage)
Surveyor 3	1967 35A	NASA	Apr 17	ETR	Atlas-Centaur	283	Flight time: 65.0 hours				Landed on Moon 4/20/67: soil sampler, photo experiments until 5/3/67
ESSA 5	1967 36A	ESSA	Apr 20	WTR	TAD	145	113.5	1,352	1,419	102.0	In orbit: replaced ESSA 3
Soyuz 1	1967 37A	USSR	Apr 23	Tyuratam	A-2	6,450	88.6	198	211	51.7	Reentered 4/24/67: recovery attempt after 18 orbits, 26.8 hr; failed due to fouled parachutes; Vladimir Komarov killed
San Marco 2	1967 38A	Italy	Apr 26	IO*	Scout	129	94.9	135	498	2.9	Decayed 10/14/67: 1st equatorial launch, returned air density data
None	None	USAF	Apr 26	WTR	Titan IIIB-Agena D	3,000	–	–	–	–	Failed to orbit
Kosmos 156	1967 39A	USSR	Apr 27	Plesetsk	A-1	4,730	95.1	467	483	81.2	In orbit: metsat, formed operational system with Kosmos 144
Vela 7	1967 40A	USAF	Apr 28	ETR	Titan IIIC	317	Current elements not maintained				In orbit: earth-oriented advanced nuclear test detection
Vela 8	1967 40B	USAF	Apr 28	ETR	Titan IIIC	317	Current elements not maintained				In orbit: lags Vela 7 by 180 degrees
ERS 18	1967 40C	USAF	Apr 28	ETR	Titan IIIC	9	Current elements not maintained				In orbit: radiation research subsatellite
OV5 3	1967 40D	USAF	Apr 28	ETR	Titan IIIC	9	Current elements not maintained				In orbit: radiation research subsatellite (ERS 20); deactivated
OV5 1	1967 40E	USAF	Apr 28	ETR	Titan IIIC	9	Current elements not maintained				In orbit: materials research subsatellite (ERS 27); deactivated
Lunar Orbiter 4	1967 41A	NASA	May 4	ETR	Atlas-Agena D	390					Crashed on Moon 10/6/67: returned 163 frames
Ariel 3	1967 42A	UK	May 5	WTR	Scout	90	95.6	497	608	80.2	Decayed 12/14/70: 1st all-British research

*Indian Ocean

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1967 43A	USAF	May 9	WTR	LTTAT-* Agena D	2,000	94.3	200	777	85.1	Decayed 7/13/67
None	1967 43B	USAF	May 9	WTR	LTTAT-Agena D	60	96.8	505	660	84.9	In orbit
Kosmos 157	1967 44A	USSR	May 12	Tyuratam	A-1	4,730	89.4	249	262	51.3	Reentered 5/20/67
Kosmos 158	1967 45A	USSR	May 15	Plesetsk	C-1	750	100.3	731	816	74.0	In orbit
Kosmos 159	1967 46A	USSR	May 17	Tyuratam	A-2-e	4,490	1174	350	60,637	51.8	Decayed 11/11/77
Kosmos 160	1967 47A	USSR	May 17	Tyuratam	F-1-r	5,000	88.4	137	177	49.6	Reentered 5/18/67: FOBS flight test
None	1967 48A	USN	May 18	WTR	Scout	60	106.8	1,062	1,095	89.7	In orbit
Kosmos 161	1967 49A	USSR	May 22	Plesetsk	A-1	4,730	89.8	201	321	65.7	Reentered 5/30/67:
None	1967 50A	USAF	May 22	WTR	Atlas-Agena D	2,000	89.1	135	293	91.5	Decayed 5/30/67
None	1967 50B	USAF	May 22	WTR	Atlas-Agena D	700	88.3	148	240	91.4	Decayed 5/27/67
Explorer 34	1967 51A	NASA	May 24	WTR	TAD	75	6,346	242	214,383	67.1	Decayed 5/3/69: returned radiation, magnetic fields data (IMP-F)
Molniya 1E	1967 52A	USSR	May 24	Tyuratam	A-2-e	1,750	715	460	39,785	64.8	Decayed 11/26/71: 5th Soviet commsat, in 12-hour orbit
ESRO 2A	None	ESRO**	May 29	WTR	Scout	74	–	–	–	–	Failed to orbit: 3rd stage failure foiled 1st European Space Research Organization launch
None	1967 53A	USAF/ USN	May 31	WTR	Thor-Agena D	700	102.6	865	875	70.0	In orbit
None	1967 53B	USAF/ USN	May 31	WTR	Thor-Agena D	2.4	103.3	906	918	70.0	In orbit: 20-inch surveillance calibration sphere
GGSE 4	1967 53C	USAF/ USN	May 31	WTR	Thor-Agena D	4	103.3	907	918	70.0	In orbit: gravity gradient stabilization experiment

*Long Tank Thrust Augmented Thor

**European Space Research Organization

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
GGSE 5	1967 53D	USAF/ USN	May 31	WTR	Thor-Agena D	4	103.3	908	919	70.0	In orbit: gravity gradient stabilization experiment
None	1967 53E	USAF/ USN	May 31	WTR	Thor-Agena D	4	103.2	902	913	70.0	In orbit
None	1967 53F	USAF/ USN	May 31	WTR	Thor-Agena D	38	103.2	906	915	70.0	In orbit: navigation experiment
None	1967 53G	USAF/ USN	May 31	WTR	Thor-Agena D	–	103.3	906	918	70.0	In orbit
None	1967 53H	USAF/ USN	May 31	WTR	Thor-Agena D	–	103.3	908	919	70.0	In orbit
None	1967 53J	USAF/ USN	May 31	WTR	Thor-Agena D	1.5	102.4	859	863	70.0	In orbit: 16-inch surveillance calibration sphere
Kosmos 162	1967 54A	USSR	Jun 1	Tyuratam	A-1	4,730	89.2	196	275	51.8	Reentered 6/9/67
None	1967 55A	USAF	Jun 4	WTR	Atlas-Agena D	2,000	89.3	149	456	104.8	Decayed 6/12/67
Kosmos 163	1967 56A	USSR	Jun 5	Kapustin Yar	B-1	357	93.1	244	611	48.4	Decayed 10/11/67
Kosmos 164	1967 57A	USSR	Jun 8	Plesetsk	A-1	4,730	89.5	185	317	65.7	Reentered 6/14/67
Venera 4	1967 58A	USSR	Jun 12	Tyuratam	A-2-e	1,104	Flight time: 128.4 days				Presumed impact on Venus 10/18/67: tx during 94-min descent
Kosmos 165	1967 59A	USSR	Jun 12	Plesetsk	B-1	250	102.1	198	1,515	81.9	Decayed 1/15/68
Mariner 5	1967 60A	NASA	Jun 14	ETR	Atlas-Agena D	244	194.6 days	0.579 AU	0.735 AU	1.37	In solar orbit: 2,480-mi Venus flyby 10/19/67
Kosmos 166	1967 61A	USSR	Jun 16	Kapustin Yar	B-1	357	92.9	281	553	48.4	Decayed 10/25/67: performed solar radiation experiments
None	1967 62A	USAF	Jun 16	WTR	LTTAT-Agena D	2,000	89.9	181	367	80.1	Decayed 7/20/67
None	1967 62B	USAF	Jun 16	WTR	LTTAT-Agena D	60	94.8	501	517	80.2	Decayed 10/22/68
Kosmos 167	1967 63A	USSR	Jun 17	Tyuratam	A-2-e	1,106	89.2	187	266	51.8	Decayed 6/25/67

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1967 64A	USAF	Jun 20	WTR	Titan IIIB-Agena D	3,000	89.8	127	325	111.5	Decayed 6/30/67
None	None	USSR	Jun 20	Tyuratam	A-1	4,730					Failed to orbit
EGRS 9	1967 65A	USA/USN	Jun 29	WTR	Thor-Burner II	20	172.1	3,792	3,946	89.8	In orbit: geodetic; location survey; deactivated
Aurora 1	1967 65B	USA/USN	Jun 29	WTR	Thor-Burner II	21	172.1	3,793	3,946	89.8	In orbit: investigated formation of Aurora Borealis
IDCSP	1967 66A	USAF	Jul 1	ETR	Titan IIIC	45	Current elements not maintained				In orbit: initial defense communications
IDCSP	1967 66B	USAF	Jul 1	ETR	Titan IIIC	45	Current elements not maintained				In orbit: initial defense communications
IDCSP	1967 66C	USAF	Jul 1	ETR	Titan IIIC	45	Current elements not maintained				In orbit: completed initial defense satcom global system
DATS 1	1967 66D	USAF	Jul 1	ETR	Titan IIIC	68	Current elements not maintained				In orbit: electronically despun antenna test
LES 5	1967 66E	USN	Jul 1	ETR	Titan IIIC	194	Current elements not maintained				In orbit: 5th experimental military tactical commsat
DODGE	1967 66F	USAF	Jul 1	ETR	Titan IIIC	102	1,318.9	33,270	33,659	5.2	In orbit: DOD gravity gradient experiment
Kosmos 168	1967 67A	USSR	Jul 4	Tyuratam	A-1	4,730	89.1	198	264	51.8	Reentered 7/12/67
Surveyor 4	1967 68A	NASA	Jul 14	ETR	Atlas-Centaur	283	Flight time: 63.0 hours				Crashed on moon 7/17/67: signal lost 2.5 min before landing
Kosmos 169	1967 69A	USSR	Jul 17	Tyuratam	F-1-r	5,000	87.6	135	200	50	Reentered 7/17/67: FOBS flight test
Explorer 35	1967 70A	NASA	Jul 19	ETR	TAD	104	Selenocentric Orbit				Measures earth's magnetic tail every 29.5 days (IMP-E)
None		USSR	Jul 21	Tyuratam	A-1						Failed to orbit
None	1967 71A	USAF	Jul 25	WTR	TAT-Agena D	1,500	94.3	458	513	75.0	Decayed 6/5/69
OV1 11	None	USAF	Jul 27	WTR	Atlas D	134	–	–	–	–	Failed to orbit: propulsion system malfunctioned
OV1 86	1967 72A	USAF	Jul 27	WTR	Atlas D	118	95.5	480	604	101.6	Decayed 2/22/72: 4 experiments including cosmic ray telescope
OV1 12	1967 72D	USAF	Jul 27	WTR	Atlas D	140	95.4	542	556	101.7	Decayed 7/22/80: flare activated radiological observatory
OGO 4	1967 73A	NASA	Jul 28	WTR	TAT-Agena D	634	98.1	411	903	86.0	Orbiting Geophysical Observatory. Decayed 2/22/72. Tape recorder failed 1/19/69; spacecraft exceeded lifetime

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 170	1967 74A	USSR	Jul 31	Tyuratam	F-1-r	5,000	88.1	121	252	49.4	Reentered 7/31/67 w/in minutes. FOBS flight test
Lunar Orbiter 5	1967 75A	NASA	Aug 1	ETR	Atlas-Agena D	389					Crashed on Moon 1/31/68: end of Lunar Orbiter photographic mapping program
None	1967 76A	USAF	Aug 7	WTR	LTTAT-Agena D	2,000	89.9	174	346	80.0	Decayed 9/1/67
Kosmos 171	1967 77A	USSR	Aug 8	Tyuratam	F-1-r	5,000	87.5	138	177	49.6	Reentered 8/8/67 w/in minutes. FOBS flight test
Kosmos 172	1967 78A	USSR	Aug 9	Tyuratam	A-1	4,730	89.4	200	293	51.8	Reentered 8/17/67
None	1967 79A	USAF	Aug 16	WTR	Titan IIIB-Agena D	3,000	89.4	142	449	111.6	Decayed 8/29/67
None	1967 80A	USAF	Aug 23	WTR	Thor-Burner II	195	102.2	822	878	98.8	In orbit
Kosmos 173	1967 81A	USSR	Aug 24	Plesetsk	B-1	325	92.3	277	480	71	Decayed 12/17/67
Kosmos 174	1967 82A	USSR	Aug 31	Tyuratam	A-2-e	1,750	715	430	39,845	64.5	Decayed 12/30/68: believed to be commsat failure
None	None	USSR	Sep 1	Tyuratam	A-1						Failed to orbit
Biosatellite 2	1967 83A	NASA	Sep 7	ETR	TAD	507	90.8	286	313	33.5	Reentered 10/4/67, biological capsule recovered after 44.9 hours
Surveyor 5	1967 84A	NASA	Sep 8	ETR	Atlas-Centaur	279	Flight time: 64.8 hours				Landed on moon 9/11/67: returned 19,000 photos, soil analysis data
Kosmos 175	1967 85A	USSR	Sep 11	Plesetsk	A-1	4,730	92.2	211	358	72.9	Reentered 9/19/67
Kosmos 176	1967 86A	USSR	Sep 12	Plesetsk	B-1	250	102.5	196	1,525	81.9	Decayed 3/3/68
None	1967 87A	USAF	Sep 15	WTR	LTTAT-Agena D	2,000	89.8	150	389	80.1	Decayed 10/4/67
Kosmos 177	1967 88A	USSR	Sep 16	Tyuratam	A-1	4,730	89.3	200	280	51.8	Reentered 9/24/67
Kosmos 178	1967 89A	USSR	Sep 19	Tyuratam	F-1-r	5,000	88.3	138	258	49.6	Reentered 9/19/67 w/in minutes. FOBS flight test
None	1967 90A	USAF	Sep 19	WTR	Titan IIIB-Agena D	3,000	89.9	122	401	106.1	Decayed 9/30/67

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 179	1967 91A	USSR	Sep 22	Tyuratam	F-1-r	5,000	87.8	139	207	49.6	Reentered 9/22/67: FOBS flight test
None	1967 92A	USAF/ USN	Sep 25	WTR	Scout	60	106.6	1,030	1,105	89.3	In orbit
Kosmos 180	1967 93A	USSR	Sep 26	Plesetsk	A-1	4,730	90.1	208	341	72.9	Reentered 10/4/67
Intelsat 2D (Pacific 2)	1967 94A	CSC	Sep 28	ETR	TAD	87	1,438.3	35,747	35,913	0.9*	In orbit: 4th Intelsat 2; trans-Pacific service begun 11/4/67
Molniya 1F	1967 95A	USSR	Oct 3	Tyuratam	A-2-e	1,750	712	502	39,868	65	Decayed 3/4/69; 6th Soviet commsat
None	1967 96A	USAF	Oct 11	WTR	Thor-Burner II	195	99.5	650	822	99.2	In orbit
Kosmos 181	1967 97A	USSR	Oct 11	Plesetsk	A-1	4,730	89.7	188	280	65.6	Reentered 10/18/67
Kosmos 182	1967 98A	USSR	Oct 16	Tyuratam	A-1	4,730	89.9	210	330	65	Reentered 10/24/67
Kosmos 183	1967 99A	USSR	Oct 18	Tyuratam	F-1-r	5,000	87.4	130	315	50	Reentered 10/18/67: FOBS flight test
OSO 4	1967 100A	NASA	Oct 18	ETR	Delta	272	92.1	546	560	33.0	Decayed 6/15/82: returned 1st pictures of sun in extreme ultraviolet
Molniya 1G	1967 101A	USSR	Oct 22	Tyuratam	A-2-e	1,750	714	508	39,710	64.7	Decayed 12/31/69: 7th Soviet commsat
Kosmos 184	1967 102A	USSR	Oct 24	Plesetsk	A-1	4,730	93.6	441	459	81.2	In orbit: 4th Soviet weather satellite
None	1967 103A	USAF	Oct 25	WTR	Titan IIIB-Agena D	3,000	89.5	136	429	111.4	Decayed 11/5/67
Kosmos 185	1967 104A	USSR	Oct 27	Tyuratam	F-1-m	4,000	98.7	518	873	64.1	Decayed 1/14/69: probable metsat
Kosmos 186	1967 105A	USSR	Oct 27	Tyuratam	A-2	6,530	88.7	172	212	51.7	Reentered 10/31/67. Docked with Kosmos 188 10/30; 1st automatic docking
Kosmos 187	1967 106A	USSR	Oct 28	Tyuratam	F-1-r	5,000	87.4	143	301	50	Reentered 10/28/67: FOBS flight test
Kosmos 188	1967 107A	USSR	Oct 30	Tyuratam	A-2	6,530	89.0	180	247	51.7	Reentered 11/2/67: target vehicle for Kosmos 188 auto docking
Kosmos 189	1967 108A	USSR	Oct 30	Plesetsk	C-1	875	95.7	524	565	74	Decayed 6/8/78
None	1967 109A	USAF	Nov 2	WTR	LTTAT-Agena D	2,000	90.7	183	410	81.5	Decayed 12/2/67

*Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1967 109B	USAF	Nov 2	WTR	LTTAT-Agena D	60	94.3	455	524	81.6	Decayed 3/28/69
Kosmos 190	1967 110A	USSR	Nov 3	Plesetsk	A-1	4,730	89.8	191	338	65.7	Reentered 11/11/67
ATS 3	1967 111A	NASA	Nov 5	ETR	Atlas-Agena D	365	1,436.1	35,730	35,844	9.2	In orbit: tx color, b&w photos of entire earth
Surveyor 6	1967 112A	NASA	Nov 7	ETR	Atlas-Centaur	280	Flight time: 65.4 hours				Landed on moon 11/10/67: performed 1st rocket takeoff from moon
Apollo 4	1967 113A	NASA	Nov 9	ETR	Saturn V	36,656	88.3	183	188	32.6	Reentered 11/9/67: successful 1st flight of Apollo/Saturn V
ESSA 6	1967 114A	ESSA	Nov 10	WTR	TAD	132	114.8	1,407	1,483	102.1	In orbit: returned photos of cloud cover every 6 min: deactivated 11/4/69 due to degraded vidicon and excessive drift out of sun synch
Kosmos 191	1967 115A	USSR	Nov 21	Plesetsk	B-1	325	92.2	267	497	71	Decayed 3/2/68
Zond	None	USSR	Nov 21	Tyuratam	D-1-e						Failed to orbit
Kosmos 192	1967 116A	USSR	Nov 23	Plesetsk	C-1	775	99.5	727	736	74	In orbit
Kosmos 193	1967 117A	USSR	Nov 25	Plesetsk	A-1	4,730	89.9	202	335	65.7	Reentered 12/3/67
WRESAT 1	1967 118A	Aust	Nov 29	Woomera	SPARTA*	45	95.7	193	1.259	83.2	Decayed 1/10/68: Weapons Research Establishment Satellite returned solar radiation and upper atmospheric data
Kosmos 194	1967 119A	USSR	Dec 3	Plesetsk	A-1	4,730	89.7	201	307	65.7	Reentered 12/11/67
OV3 6	1967 120A	USAF	Dec 5	WTR	Scout	95	92.9	412	439	90.6	Decayed 3/9/69: conducted ionospheric studies; tx ended 5th day
None	1967 121A	USAF	Dec 5	WTR	Titan IIIB-Agena D	3,000	90.2	137	430	109.5	Decayed 12/16/67
None	1967 122A	USAF	Dec 9	WTR	LTTAT-Agena D	2,000	88.4	158	237	81.6	Decayed 12/25/67
Pioneer 8	1967 123A	NASA	Dec 13	ETR	TAD	63	–	1.0 AU	1.1 AU	–	In solar orbit: 8 experiments studying solar radiation; active
TETR 1	1967 123B	NASA	Dec 13	ETR	TAD	20	92.3	287	490	32.9	Decayed 4/28/68: Apollo tracking network Test and Training Satellite

*Special Antimissile Research Test; Modified Redstone booster plus solid upper stage rockets

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 195	1967 124A	USSR	Dec 16	Plesetsk	A-1	4,730	90.1	207	353	65.7	Reentered 12/23/67
Kosmos 196	1967 125A	USSR	Dec 19	Kapustin Yar	B-1	352	95.5	223	860	49	Decayed 7/7/68
Kosmos 197	1967 126A	USSR	Dec 26	Kapustin Yar	B-1	325	91.5	217	486	48.5	Decayed 1/30/68
Kosmos 198	1967 127A	USSR	Dec 27	Tyuratam	F-1-m	4,540	103.4	889	948	65.1	In orbit: maneuvered
Surveyor 7	1968 1A	NASA	Jan 7	ETR	Atlas-Centaur	1,036	Flight time: 66.5 hours				Landed on moon 1/10/68: Surveyor program ends with 5th success in 7 tries
Explorer 36	1968 2A	NASA	Jan 11	WTR	TAID*	209	112.2	1,082	1,570	105.8	In orbit: GEOS 2 returning geodetic data
Kosmos 199	1968 3A	USSR	Jan 16	Plesetsk	A-1	4,730	90.2	204	364	65.7	Decayed 2/1/68: probable recovery attempt failed
None	1968 4A	USAF	Jan 17	WTR	TAT-Agena D	1,500	94.5	450	546	75.1	Decayed 7/7/70
None	1968 5A	USAF	Jan 18	WTR	Titan IIIB-Agena D	3,000	90.1	138	404	111.5	Decayed 2/4/68
Kosmos 200	1968 6A	USSR	Jan 19	Plesetsk	C-1	–	95.2	523	537	74	Decayed 2/24/73
Apollo 5	1968 7A	NASA	Jan 22	ETR	Uprated Saturn 1	14,360	89.5	162	214	31.6	Ascent stage decayed 1/24/68, descent stage 2/12/68; 1st successful lunar module flight test
None	1968 8A	USAF	Jan 24	WTR	LTTAT-Agena D	2,000	90.6	176	430	81.4	Decayed 2/27/68
None	1968 8B	USAF	Jan 24	WTR	LTTAT-Agena D	60	94.7	473	542	81.6	Decayed 3/4/70
Kosmos 201	1968 9A	USSR	Feb 6	Tyuratam	A-1	4,730	89.9	204	337	65	Recntered 2/14/68
Luna 14-1	None	USSR	Feb 7	Tyuratam	A-2-e						Lunar probe; failed to orbit
Kosmos 202	1968 10A	USSR	Feb 20	Kapustin Yar	B-1	325	91.5	213	482	48.4	Decayed 3/24/68
Kosmos 203	1968 11A	USSR	Feb 20	Plesetsk	C-1	600	109.2	1,181	1,200	74	In orbit
None	1968 12A	USAF	Mar 2	WTR	Scout	60	106.8	1,019	1,131	90	In orbit
Zond 4	1968 13A	USSR	Mar 2	Tyuratam	D-1-e	300	Simulated translunar				Launched into undisclosed trajectory from initial parking orbit: probable precursor to manned lunar mission

*Thrust Augmented Improved Delta

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
OGO 5	1968 14A	NASA	Mar 4	ETR	Atlas-Agena D	634	3,795.9	232	148,228	31.1°	In orbit: Orbiting Geophysical Observatory carried 24 experiments
Kosmos 204	1968 15A	USSR	Mar 5	Plesetsk	B-1	300	95.9	204	844	71	Decayed 3/2/69
Kosmos 205	1968 16A	USSR	Mar 5	Plesetsk	A-1	4,730	89.4	199	292	65.7	Reentered 3/13/68
Explorer 37	1968 17A	USN/ NASA	Mar 5	WI	Scout	198	96.4	445	640	59.4	In orbit: Solar Explorer B returned radiation data despite off-nominal orbit
Kosmos	None	USSR	Mar 6	Kapustin Yar	B-1						Failed to orbit
None	1968 18A	USAF	Mar 13	WTR	Titan IIIB-Agena D	3,000	89.9	128	407	99.9	Decayed 3/24/68
Kosmos 206	1968 19A	USSR	Mar 14	Plesetsk	A-1	4,730	95.0	449	437	81.2	In orbit: metsat; returned weather and infrared photos, thermal data
None	1968 20A	USAF	Mar 14	WTR	LTTAT-Agena D	2,000	90.2	178	391	83.0	Decayed 4/10/68
None	1968 20B	USAF	Mar 14	WTR	LTTAT-Agena D	60	94.6	481	522	83.1	Decayed 1/3/70
Kosmos 207	1968 21A	USSR	Mar 16	Plesetsk	A-1	4,730	89.8	207	300	65.6	Reentered 3/24/68
Kosmos 208	1968 22A	USSR	Mar 21	Tyuratam	A-1	4,730	89.4	208	274	65.0	Reentered 4/2/68
Kosmos 209	1968 23A	USSR	Mar 22	Tyuratam	F-1-m	4,540	103.1	874	932	65.3	In orbit: maneuvered
Kosmos 210	1968 24A	USSR	Apr 3	Plesetsk	A-1	4,730	90.3	200	373	81.2	Reentered 4/11/68
Apollo 6	1968 25A	NASA	Apr 4	ETR	Saturn V	36,806	88.2	205	392	32.5	Command module reentered 4/4/68: spacecraft performed well despite Saturn V 1st stage "pogo" effect, 2nd stage engine malfunction, 3rd stage failure to restart
OV1 13	1968 26A	USAF	Apr 6	WTR	Atlas F	107	199.1	581	9,242	99.9	In orbit: measured radiation below 5,000 mi; conducted engineering experiments
OV1 14	1968 26B	USAF	Apr 6	WTR	Atlas F	101	207.4	565	9,885	100.1	In orbit: measured radiation; power system failed after 1 week

*Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Luna 14	1968 27A	USSR	Apr 7	Tyuratam	A-2-e	1,700		Selenocentric Orbit			Studied earth-moon mass relationship, moon's gravitational field
Kosmos 211	1968 28A	USSR	Apr 9	Plesetsk	B-1	250	102.5	199	1,532	81.9	Decayed 11/10/68
Kosmos 212	1968 29A	USSR	Apr 14	Tyuratam	A-2	6,500	88.75	186	225	51.7	Soft-landed 4/19/68. Docked with Kosmos 213 4/15, 2nd USSR docking
Kosmos 213	1968 30A	USSR	Apr 15	Tyuratam	A-2	6,500	89.16	193	245	51.4	Soft-landed 4/20/68: passive target for Kosmos 212; orbited together 3 hr 50 min
None	1968 31A	USAF	Apr 17	WTR	Titan IIIB-Agena D	3,000	90.1	134	427	111.5	Decayed 4/29/68
Kosmos 214	1968 32A	USSR	Apr 18	Plesetsk	A-1	4,730	90.3	200	373	81.4	Reentered 4/26/68
Kosmos 215	1968 33A	USSR	Apr 19	Kapustin Yar	B-1	385	91.1	255	403	48.5	Decayed 6/30/68: spin-stabilized radiation observatory carried 8 small telescopes
Kosmos 216	1968 34A	USSR	Apr 20	Tyuratam	A-1	4,730	89.1	201	267	51.8	Reentered 4/28/68
Molniya 1H	1968 35A	USSR	Apr 21	Tyuratam	A-2-e	1,750	713	391	39,738	65	Decayed 1/29/74: 8th Molniya commsat in Orbita network
Zond	None	USSR	Apr 22	Tyuratam	D-1-e						Failed to orbit
Kosmos 217	1968 36A	USSR	Apr 24	Tyuratam	F-1-m	4,000	93.4	144	262	62.2	Decayed 4/26/68
Kosmos 218	1968 37A	USSR	Apr 25	Tyuratam	F-1-r	5,000	87.2	123	162	49.5	Decayed 4/25/68: possible FOBS reentry test
Kosmos 219	1968 38A	USSR	Apr 26	Kapustin Yar	B-1	300	104.7	215	1,745	48.4	Decayed 3/2/69
None	1968 39A	USAF	May 1	WTR	LTTAT-Agena D	2,000	88.6	164	243	83	Decayed 5/15/68
Kosmos 220	1968 40A	USSR	May 7	Plesetsk	C-1	775	98.5	654	723	74	In orbit
Iris (ESRO 2B)	1968 41A	ESRO*	May 17	WTR	Scout	75	98.9	334	1,085	97.2	Decayed 5/8/71: returned solar and cosmic radiation data
Nimbus B/ Secor 10	None	NASA/ USA	May 18	WTR	Thorad-Agena D	570/ 20	–	–	–	–	Failed to orbit: booster guidance malfunction forced payload destruct
None	1968 42A	USAF	May 23	WTR	Thor-Burner II	195	101.9	809	888	98.8	In orbit

*European Space Research Organization

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 221	1968 43A	USSR	May 24	Kapustin Yar	B-1	250	108.3	218	2,0860	48.4	Decayed 8/31/69
Kosmos 222	1968 44A	USSR	May 30	Plesetsk	B-1	325	92.3	285	488	71	Decayed 10/11/68
Kosmos 223	1968 45A	USSR	Jun 1	Plesetsk	A-1	4,730	90.1	200	333	72.9	Reentered 6/9/68
Kosmos 224	1968 46A	USSR	Jun 4	Tyuratam	A-1	4,730	89	203	256	51.8	Reentered 6/12/68
None	1968 47A	USAF	Jun 5	WTR	Titan IIIB-Agena D	3,000	90.1	123	456	110.5	Decayed 6/17/68
Kosmos 225	1968 48A	USSR	Jun 11	Kapustin Yar	B-1	375	92.2	255	512	48.4	Decayed 11/2/68
Kosmos 226	1968 49A	USSR	Jun 12	Plesetsk	A-1	4,730	94.1	579	639	81.2	Decayed 10/18/83: 13th metsat; returned cloud cover photos, weather data
IDSCS 19 - 26	1968 50A - 1968 50H	USAF	Jun 13	ETR	Titan IIIC	45 ea	Current elements not maintained				In orbit: supplements 18 defense satcoms previously launched
Kosmos	None	USSR	Jun 15	Tyuratam	C-1						Failed to orbit
Kosmos 227	1968 51A	USSR	Jun 18	Tyuratam	A-1	4,730	89.1	190	269	51.8	Reentered 6/26/68
None	1968 52A	USAF	Jun 20	WTR	LTTAT-Agena D	2,000	90.3	193	326	85.0	Decayed 7/16/68
None	1968 52B	USAF	Jun 20	WTR	LTTAT-Agena D	60	94.1	437	519	85.1	Decayed 1/11/70
Kosmos 228	1968 53A	USSR	Jun 21	Tyuratam	A-2	5,900	89.0	199	252	51.6	Reentered 7/3/68
Kosmos 229	1968 54A	USSR	Jun 26	Plesetsk	A-1	4,730	89.9	207	327	72.8	Reentered 7/4/68
Explorer 38	1968 55A	NASA	Jul 4	WTR	TAID	190	224.2	5,826	5,869	120.9	In orbit: Radio Astronomy Explorer 1 monitoring radio emissions from cosmic, solar, & earth sources
Kosmos 230	1968 56A	USSR	Jul 5	Kapustin Yar	B-1	367	93	285	543	48.5	Decayed 11/2/68
Molniya 1I	1968 57A	USSR	Jul 5	Tyuratam	A-2-e	1,750	713.8	401	39,803	65	Decayed 5/15/71: 9th Molniya 1 comsat
Kosmos 231	1968 58A	USSR	Jul 10	Tyuratam	A-1	4,730	89.7	199	345	65	Reentered 7/18/68
OV1 15	1968 59A	USAF	Jul 11	WTR	Atlas F	470	103.8	154	1,818	89.8	Decayed 11/6/68: air density/solar-radiation correlation experiment

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
OV1 16	1968 59B	USAF	Jul 11	WTR	Atlas F	600	91.0	163	554	89.7	Decayed 8/19/68: ionospheric drag experiment
Kosmos 232	1968 60A	USSR	Jul 16	Plesetsk	A-1	4,730	89.8	189	248	65	Reentered 7/24/68
Kosmos 233	1968 61A	USSR	Jul 18	Plesetsk	B-1	250	102.1	198	1,514	82	Decayed 2/7/69
Kosmos 234	1968 62A	USSR	Jul 30	Tyuratam	A-1	4,730	89.5	208	288	51.8	Reentered 8/5/68
None	1968 63A	USAF	Aug 6	ETR	Atlas-Agena	1,000	Current elements not maintained				In orbit
None	1968 64A	USAF	Aug 6	WTR	Titan IIIB-Agena D	3,000	90.1	142	395	110.0	Decayed 8/16/68
None	1968 65A	USAF	Aug 7	WTR	LTTAT-Burner II	3,000	88.4	152	257	82.0	Decayed 8/27/68
Explorer 39	1968 66A	NASA	Aug 8	WTR	Scout	9.3	104.8	633	1,341	80.6	Decayed 6/22/81: Air Density Explorer studied density & temperature variations at intermediate latitudes
Explorer 40	1968 66B	NASA	Aug 8	WTR	Scout	70	118.1	677	2,507	80.7	In orbit: Injun Explorer returning radiation data
Kosmos 235	1968 67A	USSR	Aug 9	Tyuratam	A-1	4,730	89.4	201	281	51.8	Reentered 8/17/68
ATS 4	1968 68A	NASA	Aug 10	ETR	Atlas-Centaur	391	94.5	219	726	29.0	Decayed 10/17/68: 2nd stage failure to restart prevented reaching synchronous orbit
ESSA 7	1968 69A	ESSA	Aug 16	WTR	Long Tank Delta	145	114.9	1,429	1,471	101.8	In orbit: replaced ESSA 5 as primary stored data satellite in TOS System (TOS E); one camera returned cloud cover photos, recorders failed; deactivated 7/19/69
OV5 8	None	USAF	Aug 16	WTR	Atlas-Burner II	9	–	–	–	–	Failed to orbit: materials friction experiment
Radcat	None	ARPA	Aug 16	WTR	Atlas-Burner II	179	–	–	–	–	Failed to orbit: radar calibration target
LCS	None	USAF	Aug 16	WTR	Atlas-Burner II	34	–	–	–	–	Failed to orbit: Lincoln Calibration Sphere for radar calibration experiment
Grid Sphere Drag	None	USAF	Aug 16	WTR	Atlas-Burner II	10 ea.	–	–	–	–	Failed to orbit: 4 spheres for drag coefficient experiment

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Orbis-Cal 1	None	USN/ USAF	Aug 16	WTR	Atlas-Burner II	37	–	–	–	–	Failed to orbit: intended to measure effect of ionosphere on communication
Secor 11	None	USA	Aug 16	WTR	Atlas-Burner II	22	–	–	–	–	Failed to orbit: geodetic
Secor 12	None	USA	Aug 16	WTR	Atlas-Burner II	22	–	–	–	–	Failed to orbit: geodetic
Lidos	None	USN	Aug 16	WTR	Atlas-Burner II	117	–	–	–	–	Failed to orbit: to investigate earth's sphericity and gravitational fields
RM 18	None	USAF	Aug 16	WTR	Atlas-Burner II	51	–	–	–	–	Failed to orbit: IR & TV measurements of earth's IR background
UV Radiometer	None	USAF	Aug 16	WTR	Atlas-Burner II	–	–	–	–	–	Failed to orbit: shortwave radiation experiment
Kosmos 236	1968 70A	USSR	Aug 27	Tyuratam	C-1	875	95.3	500	438	56.1	In orbit: probable navsat
Kosmos 237	1968 71A	USSR	Aug 27	Plesetsk	A-1	4,730	89.7	200	320	65.4	Reentered 9/4/68
Kosmos 238	1968 72A	USSR	Aug 28	Tyuratam	A-2	6,520	88.5	194	313	51.7	Reentered 9/1/68: probable Soyuz precursor
Kosmos 239	1968 73A	USSR	Sep 5	Tyuratam	A-1	4,730	89.2	203	269	51.8	Reentered 9/13/68
None	1968 74A	USAF	Sep 10	WTR	Titan IIIB-Agena D	3,000	89.1	125	404	106.0	Decayed 9/25/68
Kosmos 240	1968 75A	USSR	Sep 14	Tyuratam	A-1	4,730	89.3	202	282	51.8	Reentered 9/21/68
Zond 5	1968 76A	USSR	Sep 14	Tyuratam	D-1-e	5,375	–			51.5	Reentered 9/21/68: first lunar flyaround, recovered from Indian Ocean
Kosmos 241	1968 77A	USSR	Sep 16	Plesetsk	A-1	4,730	89.7	202	322	65.4	Reentered 9/24/68
Intelsat III F-1	None	CSC	Sep 18	ETR	Long-Tank Delta	293	–	–	–	–	Failed to orbit: 1st launch attempt of Intelsat III series; pitch rate system malfunction forced payload destruct
None	1968 78A	USAF	Sep 18	WTR	TAT-Agena D	2,000	90.1	167	393	83.0	Decayed 10/8/68

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1968 78B	USAF	Sep 18	WTR	TAT-Agena D	60	94.7	500	514	83.2	Decayed 9/28/69
Kosmos 242	1968 79A	USSR	Sep 20	Plesetsk	B-1	325	91.3	272	406	71.0	Decayed 11/13/68: probable scientific
Kosmos 243	1968 80A	USSR	Sep 23	Tyuratam	A-2	5,900	89.6	213	293	71.3	Reentered 10/4/68
OV2 5	1968 81A	USAF	Sep 26	ETR	Titan IIIC	204	Current elements not maintained				In orbit: environmental research; carried 11 experiments
OV5 2	1968 81B	USAF	Sep 26	ETR	Titan IIIC	10	630.3	184	35,787	26.4	Decayed 2/15/71, monitored particle radiation (ERS 28); all OV's deactivated
OV5 4	1968 81C	USAF	Sep 26	ETR	Titan IIIC	13	Current elements not maintained				In orbit: obtained data on heat transfer to a liquid under zero-g conditions (ERS 21)
LES 6	1968 81D	USAF	Sep 26	ETR	Titan IIIC	163	1,436.7	35,752	35,843	10.0	In orbit: 6th solid-state experimental tactical commsat
Kosmos 244	1968 82A	USSR	Oct 2	Tyuratam	F-1-r	5,000	–	134	158	50	Decayed 10/2/68: possible FOBS reentry test
Kosmos 245	1968 83A	USSR	Oct 3	Plesetsk	B-1	325	92.1	284	473	71	Decayed 1/15/69
Aurorae (ESRO 1A)	1968 84A	ESRO	Oct 3	WTR	Scout	81	102.8	258	1,538	93.7	Decayed 6/26/70: investigated auroral phenomena & polar ionosphere
Molniya 1J	1968 85A	USSR	Oct 5	Tyuratam	A-2-e	1,750	712	436	39,633	65	Decayed 7/16/76: 10th Molniya 1
None	1968 86A	USAF	Oct 5	WTR	LTTAT-Agena D	2,000	94.5	483	511	75.0	Decayed 3/26/71
Kosmos 246	1968 87A	USSR	Oct 7	Plesetsk	A-1	4,730	89.4	149	321	65.4	Reentered 10/12/68
Kosmos 247	1968 88A	USSR	Oct 11	Plesetsk	A-1	4,730	89.9	199	345	65.4	Reentered 10/19/68
Apollo 7	1968 89A	NASA	Oct 11	ETR	Saturn 1B	14,674	89.7	231	297	31.64	Reentered 10/22/68: Wally Schirra, Walt Cunningham, Donn Eisele completed near-flawless 1st manned flight of Apollo; recovered after 163 orbits, 260.2 hrs
Kosmos 248	1968 90A	USSR	Oct 19	Tyuratam	F-1-m	4,000	94.8	475	543	62.3	Decayed 2/26/80: ASAT target. Destroyed 11/1; 5 pieces
Kosmos 249	1968 91A	USSR	Oct 20	Tyuratam	F-1-m	3,320	111.8	517	2,092	62.4	In orbit: ASAT warhead, 60 pieces
None	1968 92A	USAF	Oct 23	WTR	Thor-Burner II	195	101.2	792	838	98.5	In orbit

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Soyuz 2	1968 93A	USSR	Oct 25	Tyuratam	A-2	6,520	88.5	196	200	51.7	Reentered 10/28/68: rendezvous target for Soyuz 3; unmanned
Soyuz 3	1968 94A	USSR	Oct 26	Tyuratam	A-2	6,575	88.6	177	203	51.4	Reentered 10/30/68: Georgi Beregovoi maneuvered to 650 ft from Soyuz 2, landed after 64 orbits, 94.9 hrs
Kosmos 250	1968 95A	USSR	Oct 30	Plesetsk	C-1	875	95.3	522	542	74	Decayed 2/15/78: possible navsat
Kosmos 251	1968 96A	USSR	Oct 31	Tyuratam	A-2	6,300	89.1	201	255	65	Reentered 11/18/68
Kosmos 252	1968 97A	USSR	Nov 1	Tyuratam	F-1-m	3,320	112.2	551	2,102	62.3	ASAT warhead, 56 pieces in orbit
None	1968 98A	USAF	Nov 3	WTR	TAT-Agena D	2,000	88.7	150	288	82.1	Decayed 11/23/68
None	1968 99A	USAF	Nov 6	WTR	Titan IIIB-Agena D	3,000	88.6	130	390	106.0	Decayed 11/20/68
Pioneer 9	1968 100A	NASA	Nov 8	ETR	TAID	63	297.5 days	0.75 AU	1.0 AU	–	In solar orbit: 8 experiments provided data on solar radiation. Pronounced dead 3/3/87 after 18.5 yrs of service
TETR 2	1968 100B	NASA	Nov 8	ETR	TAID	40	97.9	378	940	32.8	Decayed 9/19/79: 2nd orbiting target for NASA's Manned Space Flight Network, Test and Training satellite
Zond 6	1968 101A	USSR	Nov 10	Tyuratam	D-1-e	5,375	Circumlunar				Reentered 11/17/68: 2nd unmanned circumlunar flight; landed in USSR after double-dip glide reentry, aerodynamic lift for deceleration
Kosmos 253	1968 102A	USSR	Nov 13	Plesetsk	A-1	4,730	89.9	200	333	65.4	Reentered 11/18/68
Proton 4	1968 103A	USSR	Nov 16	Tyuratam	D	17,000	91.75	248	477	31.5	Decayed 7/24/69: performed cosmic ray measurements
Kosmos 254	1968 104A	USSR	Nov 21	Plesetsk	A-1	4,730	89.8	197	335	65.4	Reentered 11/29/68
Kosmos 255	1968 105A	USSR	Nov 29	Plesetsk	A-1	4,730	89.7	197	317	65.4	Reentered 12/7/68
Kosmos 256	1968 106A	USSR	Nov 30	Plesetsk	C-1	600	109.3	1,170	1,222	74.1	In orbit
STV 1 (F-7)	None	ELDO*	Nov 30	Woomera	Europa 1	249	–	–	–	–	Failed to orbit: premature 3rd stage shutdown foiled launch of Satellite Test Vehicle; 7th Europa 1 launch test, 1st orbital try
Kosmos 257	1968 107A	USSR	Dec 3	Plesetsk	B-1	325	91.7	286	462	71	Decayed 3/5/69
None	1968 108A	USAF	Dec 4	WTR	Titan IIIB-Agena D	3,000	91.9	136	736	106.1	Decayed 12/12/68

*European Launcher Development Organization

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
HEOS 1	1968 109A	ESRO	Dec 5	ETR	TAID	108	6792.7	2,418	223,440	28.2	Decayed 10/28/75: Highly Eccentric Orbiting Satellite studied magnetic fields outside earth's magnetosphere
OAO A2	1968 110A	NASA	Dec 7	ETR	Atlas-Centaur	2,012	100.2	761	770	35.0	In orbit: Orbiting Astronomical Observatory with 11 telescopes studying stars in UV, IR, gamma & X-ray
Kosmos 258	1968 111A	USSR	Dec 10	Tyuratam	A-1	4,730	89.6	202	282	65	Reentered 12/18/68
None	1968 112A	USAF	Dec 12	WTR	LTTAT-Agena D	2,000	88.6	169	248	81.0	Reentered 12/28/68
None	1968 112B	USAF	Dec 12	WTR	LTTAT-Agena D	60	114.3	1,380	1,469	80.4	In orbit
Kosmos 259	1968 113A	USSR	Dec 14	Kapustin Yar	B-1	325	100.3	246	1,308	48.5	Decayed 5/5/69
ESSA 8	1968 114A	ESSA	Dec 15	WTR	Long-Tank Delta	132	114.6	1,411	1,461	101.2	In orbit: Metsat
Kosmos 260	1968 115A	USSR	Dec 16	Tyuratam	A-2-e	1,750	712	518	39,570	65	Decayed 7/9/73: possible Molniya failure
Intelsat III F-2	1968 116A	CSC	Dec 19	ETR	Long-Tank Delta	293	1,436	35,770	35,790	0.7*	In orbit: 1st successful launch for Intelsat III full-global system; positioned off coast of Brazil. Developed temporary antenna malfunction 6/29/69
Kosmos 261	1968 117A	USSR	Dec 20	Plesetsk	B-1	347	93.1	207	642	71	Decayed 2/12/69: Soviet bloc joint experiments in air density, polar auroras
Apollo 8	1968 118A	NASA	Dec 21	ETR	Saturn V	28,833	88.15	191	191	32.6	Reentered 12/27/68: 1st manned circumlunar flight; Frank Borman, James Lovell, William Anders recovered in mid-Pacific after 10 lunar orbits, 147 hrs
Kosmos 262	1968 119A 1969	USSR	Dec 26	Kapustin Yar	B-1	352	95.2	259	798	48.5	Decayed 7/18/69
Venera 5	1969 1A	USSR	Jan 5	Tyuratam	A-2-e	1,128	Flight time: 131 days				Descent capsule entered Venusian atmosphere 5/16/69: penetrated deeper than Venera 4; aerodynamic and parachute descent; presumed impact

*Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Venera 6	1969 2A	USSR	Jan 10	Tyuratam	A-2-e	1,128	Flight Time: 127 days				Descent capsule entered Venusian atmosphere 5/17/69: penetrated deeper than Venera 4; aerodynamic and parachute descent; presumed impact
Kosmos 263	1969 3A	USSR	Jan 12	Plesetsk	A-1	4,730	89.8	200	325	65.4	Reentered 1/20/69
Soyuz 4	1969 4A	USSR	Jan 14	Tyuratam	A-2	6,625	88.3	161	215	51.70	Reentered 1/17/69: Vladimir Shatalov performed manual docking with Soyuz 5 in 1st link-up of 2 manned vehicles; landed with 2 Soyuz 5 cosmonauts on 48th orbit after 71.2 hrs
Soyuz 5	1969 5A	USSR	Jan 15	Tyuratam	A-2	6,585	88.7	124	143	51.70	Reentered 1/18/69: Yevgeni Khrunov, Alexei Yeliseyev performed 1 hr EVA, transferred to Soyuz 4 in emergency rescue rehearsal; Boris Volynov landed alone after 50th orbit; 72.8 hrs
Luna	None	USSR	Jan 19	Tyuratam	D-1-e						Lunar probe; failed to orbit
OSO 5	1969 6A	NASA	Jan 22	ETR	Delta	291	93.4	536	561	33.0	Decayed 4/24/84. Orbiting Solar Observatory returned solar radiation data
None	1969 7A	USAF	Jan 22	WTR	Titan IIIB-Agena D	3,000	96.9	132	1,090	106.1	Decayed 2/3/69
Kosmos 264	1969 8A	USSR	Jan 23	Tyuratam	A-1	4,730	89.7	209	295	70	Reentered 2/5/69
None	None	USSR	Jan 24	Tyuratam	F-1						Failed to orbit
ISIS 1	1969 9A	Can	Jan 30	WTR	TAID	241	128.1	575	3,494	88.4	In orbit: continuing ionospheric studies begun with Alouette 1
None	1969 10A	USAF	Feb 5	WTR	LTTAT-Agena D	2,000	88.7	178	239	81.5	Decayed 2/24/69
None	1969 10B	USAF	Feb 5	WTR	LTTAT-Agena D	60	114.0	1,393	1,430	80.4	In orbit
Intelsat III F-3	1969 11A	CSC	Feb 6	ETR	LTTA-* Delta	293	1,436.4	35,782	35,808	1.3**	In orbit: 2nd successful launch of Intelsat III; initially located over Pacific; repositioned over Indian Ocean, at 63 degrees e long
Kosmos 265	1969 12A	USSR	Feb 7	Plesetsk	B-1	325	91.9	275	458	71	Decayed 5/1/69
Tacsat 1	1969 13A	USAF	Feb 9	ETR	Titan IIIC	730	Current elements not maintained				In orbit: experimental military commsat (formerly Tacomsat)

*Long Tank Thrust Augmented
**Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Mariner 6	1969 14A	NASA	Feb 24	ETR	Atlas-Centaur	412		Heliocentric Orbit			Flew over Mars equator 2,120 mi, 7/31/69; sent 75 TV pictures at 42.3 sec intervals (See Mariner 7)
Kosmos 266	1969 15A	USSR	Feb 25	Plesetsk	A-1	4,730	89.9	202	236	72.9	Reentered 3/5/69
ESSA 9	1969 16A	ESSA	Feb 26	ETR	TAID	145	115.2	1,423	1,502	102	In orbit: final ESSA launch in TOS System replaced ESSA 7; fully operational, carries AVCS
Kosmos 267	1969 17A	USSR	Feb 26	Tyuratam	A-1	4,730	89.9	205	329	65	Reentered 3/6/69
Apollo 9 **LM** **S-4-B**	1969 18A 1969 18C	NASA	Mar 3	ETR	Saturn V	36,511	89.0 164.7	203 227 Escape trajectory	229 6,935	32.6 28.9	Reentered 3/13/69: James McDivitt, David Scott, Russell Schweickart aboard. 1st manned flight of Apollo LM; splashdown after 151 orbits, 241.9 hr, including 40-min EVA
None	1969 19A	USAF	Mar 4	WTR	Titan IIIB-Agena D	—	90.2	134	461	92	Decayed 3/18/69
Kosmos 268	1969 20A	USSR	Mar 5	Kapustin Yar	B-1	250	109.2	209	2,173	48.4	Decayed 5/9/70: possible space physics experiments
Kosmos 269	1969 21A	USSR	Mar 5	Plesetsk	C-1	875	95.3	525	543	74	Decayed 10/21/78: possible navsat
Kosmos 270	1969 22A	USSR	Mar 6	Plesetsk	A-1	4,730	89.8	200	331	65.4	Reentered 3/14/69
Kosmos 271	1969 23A	USSR	Mar 15	Plesetsk	A-1	4,730	89.7	196	324	65.4	Reentered 3/21/69
Kosmos 272	1969 24A	USSR	Mar 17	Plesetsk	C-1	600	109.2	1,177	1,206	74	In orbit: possible navsat
OV1 17	1969 25A	USAF	Mar 18	WTR	Atlas F	142	93.2	397	463	99.1	Decayed 3/5/70: 12 solar radiation experiments
OV1 18	1969 25B	USAF	Mar 18	WTR	Atlas F	125	95	466	583	98.8	Decayed 8/27/72: studied ionosphere; measured radio interference, electric fields, radiation
OV1 19	1969 25C	USAF	Mar 18	WTR	Atlas F	124	152.4	470	5,677	104.7	In orbit: 7 experiments studied trapped radiation, 5 studied radiation hazards
OV1 17A (Orbis-Cal 2)	1969 25D	USAF	Mar 18	WTR	Atlas F	221	89.8	175	309	99	Decayed 3/24/69: 2 radio beacons mounted on OV1 17 propulsion module
None	1969 26A	USAF	Mar 19	WTR	LTTAT-Agena D	2,000	86.6	179	241	82.9	Decayed 3/24/69

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1969 26B	USAF	Mar 19	WTR	LTTAT Agena D	60	94.7	504	513	83	Decayed 12/6/71
Kosmos 273	1969 27A	USSR	Mar 22	Plesetsk	A-1	4,730	89.9	198	329	65.4	Reentered 3/30/69
Kosmos 274	1969 28A	USSR	Mar 24	Tyuratam	A-1	4,730	89.6	206	300	65	Reentered 4/1/69
Meteor 1	1969 29A	USSR	Mar 26	Plesetsk	A-1	3,800	97.1	600	639	81.2	In orbit: metsat, returned cloud, snow, ice cover data during daylight & dark. Booster exploded 3/28, 38 pieces
Mars	None	USSR	Mar 27	Tyuratam	D-1-e						Mars probe; failed to orbit
Mariner 7	1969 30A	NASA	Mar 27	ETR	Atlas Centaur	412	Heliocentric Orbit				Flew over Mars southern hemisphere at 2,190 mi, 8/5/69; sent 126 TV pictures, (See Mariner 6)
Kosmos 275	1969 31A	USSR	Mar 28	[illegible]etsk	B-1	300	95.2	273	780	71	Decayed 2/7/70: possible solar flare monitor
Kosmos 276	1969 32A	USSR	Apr 4	[illegible]esetsk	A-1	4,730	90.4	200	371	81.4	Reentered 4/11/69
Kosmos 277	1969 33A	USSR	Apr 4	Plesetsk	B-1	325	92	268	466	71	Decayed 7/6/69
Kosmos 278	1969 34A	USSR	Apr 9	Plesetsk	A-1	4,730	89.7	198	310	65	Reentered 4/17/69
Molniya 1K	1969 35A	USSR	Apr 11	Tyuratam	A-2-e	1,750	713	404	39,741	65	Decayed 4/17/74: 11th Molniya 1
None	1969 36A	USAF	Apr 13	ETR	Atlas Agena D	700	Current elements not maintained				In orbit
Nimbus 3	1969 37A	NASA	Apr 14	WTR	Thorad Agena D	575	107.3	1,070	1,130	99.6	In orbit: 3rd metsat returned IR, UV, geodetic, and TV data
Secor 13	1969 37B	USA	Apr 14	WTR	Thorad Agena D	20	107.2	1,068	1,128	99.6	In orbit: Army geodetic; deactivated
Kosmos 279	1969 38A	USSR	Apr 15	Tyuratam	A-1	4,730	89.1	192	267	51.8	Reentered 4/23/69
None	1969 39A	USAF	Apr 15	WTR	Titan IIIB Agena D	3,000	89.9	135	410	108.7	Decayed 4/30/69
Kosmos 280	1969 40A	USSR	Apr 23	Tyuratam	A-2	6,300	89.1	207	250	51.6	Reentered 5/6/69
None	1969 41A	USAF	May 2	WTR	Thorad Agena D	2,000	89.4	179	326	65.4	Decayed 5/23/69

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1969 41B	USAF	May 2	WTR	Thorad Agena D	60	93.3	401	473	65.7	Decayed 2/16/70
Kosmos 281	1969 42A	USSR	May 13	Plesetsk	A-1	4,730	89.9	191	303	65.4	Reentered 5/21/69
Apollo 10	1969 43A	NASA	May 18	ETR	Saturn V	42,530	88.1	183	184	32.5	Reentered 5/26/69: 2nd manned U.S. circumlunar flight: LM piloted w/in 9.26 mi of moon on 5/22/69. Thomas Stafford, John Young, Eugene Cernan splashed down after 192.1 hr; 1st color TV from space
LM Ascent	1969 43D							Escape trajectory			
Kosmos 282	1969 44A	USSR	May 20	Plesetsk	A-1	4,730	89.9	202	321	65.4	Reentered 5/28/69
Intelsat III F-4	1969 45A	CSC	May 22	ETR	LTTA Delta	293	1,418.9	35,276	35,670	0.5*	In orbit: 3rd successful Intelsat III; stationed at 174 deg. e long. over Pacific. With Intelsat IIIC, completed 1st global commercial communications satellite system
Vela 9	1969 46A	USAF	May 23	ETR	Titan IIIC	259	Current elements not maintained				In orbit: advanced nuclear test detection satellite
Vela 10	1969 46B	USAF	May 23	ETR	Titan IIIC	259	Current elements not maintained				In orbit: same as above, positioned 180 degrees behind Vela 9
OV5 5	1969 46C	USAF	May 23	ETR	Titan IIIC	11	Current elements not maintained				In orbit: VLF plasma wave detector for deep space; also identified as ERS 29
OV5 6	1969 46D	USAF	May 23	ETR	Titan IIIC	10	Current elements not maintained				In orbit: solar flare particle detectors
OV5 9	1969 46E	USAF	May 23	ETR	Titan IIIC	13	Current elements not maintained				In orbit: solar flare, radiation, and low-energy detectors
Kosmos 283	1969 47A	USSR	May 27	Plesetsk	B-1	250	102.1	199	1,501	82	Decayed 12/10/69
Kosmos 284	1969 48A	USSR	May 29	Tyuratam	A-1	4,730	89.5	205	294	51.8	Reentered 6/6/69
Kosmos 285	1969 49A	USSR	Jun 3	Plesetsk	B-1	325	92.2	267	493	71	Decayed 10/7/69: possible solar flare monitor
None	1969 50A	USAF	Jun 3	WTR	Titan IIIB Agena D	3,000	89.7	137	414	109.9	Decayed 6/14/69
Luna 15-2		USSR	Jun 4	Tyuratam	D-1-e						Lunar probe; failed to orbit
OGO 6	1969 51A	NASA	Jun 5	WTR	LTTAT Agena D	634	99.6	397	1,089	81.9	Decayed 10/12/79: geophysical observatory, completed launch program; 23 of 25 experiments returned data; celestial lyman-alpha experiment returned data until 6/23/69
Kosmos 286	1969 52A	USSR	Jun 15	Plesetsk	A-1	4,730	89.8	200	327	65.4	Reentered 6/23/69

*Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Explorer 41	1969 53A	NASA	Jun 21	WTR	TAID	174	4840	378	176,434	83.8	Decayed 12/23/72: returned cislunar space radiation data; IMP G
Kosmos 287	1969 54A	USSR	Jun 24	Tyuratam	A-1	4,730	89	188	264	51.8	Reentered 7/2/69
Kosmos 288	1969 55A	USSR	Jun 27	Tyuratam	A-1	4,730	89.2	199	273	51.8	Reentered 7/5/69
Biosatellite 3	1969 56A	NASA	Jun 29	ETR	LTTA-Delta N	695	92	221	240	33.5	Decayed 1/20/70: experiment capsule reentered 7/7/69: mission shortened to 9 days; in-flight experiment data satisfactory for brief mission; 3rd of 4 flights in series
STV 2 (F-8)	None	ELDO	Jul 2	Woomera	Europa 1	249	–	–	–	–	Failed to orbit: 3rd stage did not ignite; second ELDO attempt to launch Satellite Test Vehicle (STV); 8th test of Europa 1
None	None	USSR	Jul 3	Tyuratam	G-1						1st of Saturn-type boosters; failed to orbit
Kosmos 289	1969 57A	USSR	Jul 10	Plesetsk	A-1	4,730	102.1	194	325	82	Reentered 7/15/69
Luna 15	1969 58A	USSR	Jul 13	Tyuratam	D-1-e	2,718	Flight Time: 204 hr, 56 mn				Crashed on Moon 7/21/69 after 52 orbits around it. Orbit altered twice unlike Luna 9 & 13
Apollo 11	1969 59A	NASA	Jul 16	ETR	Saturn V	43,811	–	183	184	32.7	Reentered 7/24/69: 1st manned lunar landing 7/20/69. 2.5-hr EVA by Neil Armstrong, Edwin Aldrin. Eagle landed in Sea of Tranquility, stayed 21.6 hr. CM pilot Michael Collins in lunar orbit 59.5 hr; splashdown after 195.31 hr
EALSEP		NASA	Jul 20				23.49 e, 0.67 n (lunar surface)				Science Station data until 10/1/77
Kosmos 290	1969 60A	USSR	Jul 22	Plesetsk	A-1	4,730	89.8	195	332	65.4	Reentered 7/30/69
Molniya 1L	1969 61A	USSR	Jul 22	Tyuratam	A-2-e	1,750	711	499	39,519	64.9	Decayed 6/18/71: 12th Molniya 1
None	1969 62A	USAF	Jul 23	WTR	Thor-Burner II	195	101.1	775	844	98.5	In orbit
None	1969 63A	USAF	Jul 24	WTR	Thorad-Agena D	2,000	88.4	178	220	74.9	Decayed 8/23/69
Intelsat III F-5	1969 64A	CSC	Jul 26	ETR	LTTA-Delta	269	115.3	252	1,301	30.3	In orbit: unusable, 3rd stage malfunction placed it in incorrect orbit

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1969 65A	USAF	Jul 31	WTR	Thorad Agena D	2,000	94.6	462	541	75.0	Decayed 1/4/73
Kosmos 291	1969 66A	USSR	Aug 6	Tyuratam	F-1-m	4,000	91.5	147	548	62.3	Decayed 9/8/69
Zond 7	1969 67A	USSR	Aug 8	Tyuratam	D-1-e	5,979	88.2	115.6	116.2	51.4	Reentered 8/14/69: 3rd unmanned circumlunar flight; recovered in USSR
OSO 6	1969 68A	NASA	Aug 9	ETR	LTTA Delta N	290	91.1	491	554	33.0	Decayed 3/7/81: Advancced solar physics research platform; main new ability is offseet raster scan and scan near edge of sun's disk
PAC 1	1969 68B	NASA	Aug 9	ETR	LTTA Delta N	120	95.0	485	554	32.9	Decayed 4/28/77: test oof semi-active gravity-gradient stabilization (SAGS) technique, PPackage Attitude Control
ATS 5	1969 69A	NASA	Aug 12	ETR	Atlas Centaur	821	1436.3	34,383	38,298	7.0	In orbit: near 108 degreees w long. off west coast of S.A., in synchronous orbit; malfuunction of nutation damper caused flat spin; partial success
Kosmos 292	1969 70A	USSR	Aug 13	Plesetsk	C-1	775	99.6	731	749	74	In orbit
Kosmos 293	1969 71A	USSR	Aug 16	Tyuratam	A-2	5,900	89.1	208	256	51.8	Reentered 8/28/69
Kosmos 294	1969 72A	USSR	Aug 19	Plesetsk	A-1	4,730	89.8	200	329	65.4	Reentered 8/27/69
Kosmos 295	1969 73A	USSR	Aug 22	Plesetsk	B-1	325	92	270	469	71	Decayed 12/1/69: possibble co-orbital test
None	1969 74A	USAF	Aug 22	WTR	Titan IIIB Agena D	3,000	89.7	133	366	108.0	Decayed 9/7/69
Pioneer E/ TETR C	None	NASA	Aug 27	ETR	LTTA Delta	67/20	–	–	–	–	Failed to orbit: 1st stagee hydraulics failure forced destruction after 8 min 3 sec
Kosmos 296	1969 75A	USSR	Aug 29	Tyuratam	A-1	4,730	89.6	207	302	65	Reentered 9/6/69
Kosmos 297	1969 76A	USSR	Sep 2	Plesetsk	A-1	4,730	89.7	205	309	72.9	Reentered 9/10/69
Kosmos 298	1969 77A	USSR	Sep 15	Tyuratam	F-1-r	5,000	87.3	127	162	49.6	Decayed 9/15/69
Kosmos 299	1969 78A	USSR	Sep 18	Tyuratam	A-1	4,730	89.5	207	284	65	Reentered 9/22/69
Lambda 4S-4	None	Japan	Sep 22	Uchinoura	Lambda 4S	25	–	–	–	–	Failed to orbit: 4th launcch failure of Lambda vehicle; attributed to attitude control systeem in 4th stage

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1969 79A	USAF	Sep 22	WTR	Thorad Agena D	2,000	88.7	178	253	85.0	Decayed 10/12/69
None	1969 79B	USAF	Sep 22	WTR	Thorad Agena D	60	94.4	490	496	85.1	Decayed 5/16/71
Kosmos 300	1969 80A	USSR	Sep 23	Tyuratam	D-1-e	5,600	88.2	184	189	51.5	Decayed 9/27/69: possible lunar test
Kosmos 301	1969 81A	USSR	Sep 24	Plesetsk	A-1	4,730	89.4	195	289	65.4	Reentered 10/2/69
None	1969 82A	USAF	Sep 30	WTR	Thorad Agena D	60	93.8	446	484	69.6	Decayed 10/30/70
None	1969 82B-K	USAF	Sep 30	WTR	Thorad Agena D	–	Current elements not maintained				In orbit: 9 subsatellites. Booster exploded 10/4. 126 pieces in orbit
Boreas (ESRO 1B)	1969 83A	ESRO	Oct 1	WTR	Scout	80	92.0	291	389	86.0	Decayed 11/23/69: ionospheric and auroral experiments; early decay due to booster malfunction
Meteor 2	1969 84A	USSR	Oct 6	Plesetsk	A-1	3,800	96.8	573	613	81.2	In orbit: metsat to expand weather service; monitors cloud and ice cover, IR, & thermal energy reflected and radiated from earth's atmosphere
Soyuz 6	1969 85A	USSR	Oct 11	Tyuratam	A-2	6,577	88.4	192	231	51.7	Reentered 10/16/69: began world's 1st triple launch of manned ships, a record 7 people. Georgi Shonin, Valeri Kubasov conducted automatic welding experiments. 80 orbits, 118.7 hrs
Soyuz 7	1969 86A	USSR	Oct 12	Tyuratam	A-2	6,570	88.6	210	223	51.7	Reentered 10/17/69: Anatoli Filipchenko, Vladislav Volkov, Viktor Gorbatko did autonomous navigation experiments, studies and photographs; passive in maneuvers. Soft-landed after 80 orbits, 118.7 hrs
Soyuz 8	1968 87A	USSR	Oct 13	Tyuratam	A-2	6,646	88.6	201	227	51.7	Reentered 10/18/69: Vladimir Shatalov, Alexei Yeliseyev did multiple maneuvering with Soyuz 7, probable docking failure. 80 orbits, 118.7 hrs

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Interkosmos 1	1969 88A	USSR	Oct 14	Kapustin Yar	B-1	320	93.3	254	626	48.4	Reentered 1/2/70: int'l experiments from 3 East European countries to study sun's UV, X-ray effects on upper atmosphere
Kosmos 302	1969 89A	USSR	Oct 17	Plesetsk	A-1	4,730	89.7	198	321	65.4	Reentered 10/25/69
Kosmos 303	1969 90A	USSR	Oct 18	Plesetsk	B-1	325	92.0	270	466	71.0	Decayed 1/23/70
Kosmos 304	1969 91A	USSR	Oct 21	Plesetsk	C-1	795	99.7	734	754	74.0	In orbit: possible navigation/geodetic
Kosmos 305	1969 92A	USSR	Oct 22	Tyuratam	D-1-e	5,600	88.4	175	206	51.5	Decayed 10/24/69: possible lunar mission test; two modules
Kosmos 306	1969 93A	USSR	Oct 24	Tyuratam	A-2	5,700	89.7	215	299	65.0	Reentered 11/5/69
Kosmos 307	1969 94A	USSR	Oct 24	Kapustin Yar	B-1	250	109.1	214	2,157	48.4	Decayed 12/30/70: possible radiation and geo-astrophysical research mission
None	1969 95A	USAF	Oct 24	WTR	Titan IIIB Agena D	3,000	92.1	136	740	108.0	Decayed 11/8/69
Kosmos 308	1969 96A	USSR	Nov 4	Plesetsk	B-1	325	91.3	271	408	71.0	Decayed 1/5/70
Azur 1 (GRS A)	1969 97A	Ger	Nov 8	WTR	Scout	71	115.2	379	2,550	102.8	In orbit: contains 7 experiments to study Van Allen belts, auroral, solar particles (German Research Satellite A)
Kosmos 309	1969 98A	USSR	Nov 12	Plesetsk	A-2	5,900	90.1	185	364	65.4	Reentered 11/20/69
Apollo 12	1969 99A	NASA	Nov 14	ETR	Saturn V	43,848	88.1	183	199	–	Reentered 11/24/69: 2nd manned lunar landing 11/19/69; 2 EVA's by Pete Conrad, Alan Bean, 11/99 and 11/20. LM "Intrepid" landed in Ocean of Storms, stayed 31.6 hr; CM "Yankee Clipper" pilot Richard Gordon in lunar orbit 89 hrs; splashdown after 244.6 hr
ALSEP 12		NASA					23.45 w, 2.94 s (lunar surface)				Science station data until 10/1/77
Kosmos 310	1969 100A	USSR	Nov 15	Tyuratam	A-1	4,730	89.8	204	336	65.0	Reentered 11/23/69
Skynet 1	1969 101A	UK	Nov 22	ETR	Delta	243	1,407.8	34,702	35,838	2.4*	In orbit: 1st scheduled launch of synchronous military defense satcoms for Britain; positioned over Indian Ocean
Kosmos 311	1969 102A	USSR	Nov 24	Plesetsk	B-1	325	92.0	273	469	71.0	Decayed 3/10/70
Kosmos 312	1969 103A	USSR	Nov 24	Plesetsk	C-1	600	108.6	1,140	1,173	74.0	In orbit: possible navigation/geodetic
Kosmos 313	1969 104A	USSR	Dec 3	Plesetsk	A-2	5,700	89.1	198	259	65.4	Reentered 12/15/69

*Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1969 105A	USAF	Dec 4	WTR	Thorad Agena D	2,000	88.5	159	251	81.5	Decayed 1/10/70
Kosmos 314	1969 106A	USSR	Dec 11	Plesetsk	B-1	325	91.9	272	465	71.0	Decayed 3/22/70
Kosmos 315	1969 107A	USSR	Dec 20	Plesetsk	C-1	325	95.3	518	542	74.1	Decayed 3/25/79: possible navigation/geodetic
Kosmos 316	1969 108A	USSR	Dec 23	Tyuratam	F-1-m	3,640	102.7	152	1,638	49.5	Decayed 8/28/70: possible maneuverable test; not believed successfully orbited
Kosmos 317	1969 109A	USSR	Dec 23	Plesetsk	A-2	6,300	89.4	205	280	65.4	Reentered 1/5/70
Interkosmos 2	1969 110A	USSR	Dec 25	Kapustin Yar	B-1	320	98.5	200	1,178	48.4	Decayed 6/7/70: 2nd international satellite carrying East European-made ionospheric observation and survey equipment
Kosmos 318	1970 1A	USSR	Jan 9	Tyuratam	A-2	5,700	89.3	203	277	65.0	Reentered 1/21/70
None	1970 2A	USAF	Jan 14	WTR	Titan IIIB-Agena D	3,000	89.69	134	383	109.9	Decayed 2/1/70
Intelsat III F-6	1970 3A	CSC	Jan 15	ETR	TAT-Delta	293	1,436.1	35,773	35,801	0.9*	In orbit: 6th in Intelsat III series; stationed at 336 deg. e long. over Atlantic
Kosmos 319	1970 4A	USSR	Jan 15	Plesetsk	B-1	250	102	200	1,508	82.0	Decayed 7/1/70
Kosmos 320	1970 5A	USSR	Jan 16	Kapustin Yar	B-1	375	90	247	326	48.5	Decayed 2/10/70
Kosmos 321	1970 6A	USSR	Jan 20	Plesetsk	B-1	365	92	272	479	71.0	Decayed 3/23/70
Kosmos 322	1970 7A	USSR	Jan 21	Plesetsk	A-1	4,730	89.7	195	319	65.4	Reentered 1/29/70
ITOS-1 (Tiros M)	1970 8A	NASA	Jan 23	WTR	TAT-Delta M	309	115.0	1,432	1,477	101.8	In orbit: 1st of 2nd generation metsats; became operational 6/15/70. Improved TIROS Operational Satellite
Oscar 5	1970 8B	Aust	Jan 23	WTR	TAT-Delta M	18	115.0	1,432	1,476	101.8	In orbit: 5th amateur radio commsat, transmitted 46 days
SERT 2	1970 9A	USAF	Feb 4	WTR	TAT-Delta-Agena D	1,404	106.0	1,040	1,045	99.2	In orbit: Space Electric Rocket Test. 1st orbital test of electron ion engine; radio interference experiment operated for 3 mo, one engine operated for 3,785 hrs; the other engine 2,011 hr.; considered unsuccessful
None	None	USSR	Feb 6	Tyuratam	D-1-e						Kosmos mission; failed to orbit

*Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 323	1970 10A	USSR	Feb 10	Plesetsk	A-1	4,730	89.4	201	314	65.4	Reentered 2/18/70
Osumi	1970 11A	Japan	Feb 11	Uchinoura	Lambda 4S-5	12	130.7	333	3,589	31.1	In orbit: 1st successful independent launch by Japan; engineering test for launching a scientific payload
None	1970 12A	USAF	Feb 11	WTR	Thor Burner II	195	101.1	759	850	98.8	In orbit
Molniya 1-13	1970 13A	USSR	Feb 19	Plesetsk	A-2-e	1,750	703	461	39,170	65.3	Decayed 9/29/75: 13th in Molniya I series
Kosmos 324	1970 14A	USSR	Feb 27	Plesetsk	B-1	325	91.9	275	466	71.0	Decayed 5/23/70
Kosmos 325	1970 15A	USSR	Mar 4	Plesetsk	A-1	4,730	89.8	200	327	65.4	Reentered 3/12/70
None	1970 16A	USAF	Mar 4	WTR	Thorad-Agena D	2,000	87.7	167	257	88.0	Decayed 3/26/70
DIAL-1-WIKA	1970 17A	Ger	Mar 10	Kourou	Diamant B	63	104.3	301	1,631	5.4	Decayed 10/5/78: 1st foreign payload launched by France; scientific capsule
MIKA	1970 17B	France	Mar 10	Kourou	Diamant B	52	104.7	313	1,665	5.4	Decayed 9/9/74: engineering capsule to measure launch vehicle performance
Kosmos 326	1970 18A	USSR	Mar 13	Plesetsk	A-1	4,730	90.2	203	363	81.4	Reentered 3/21/70
Meteor 3	1970 19A	USSR	Mar 17	Plesetsk	A-1	3,800	93.4	419	457	81.1	Decayed 11/18/83. Metsat to expand weather service
Kosmos 327	1970 20A	USSR	Mar 18	Plesetsk	B-1	300	95.5	280	819	70.9	Decayed 1/19/71
NATO 1	1970 21A	NATO	Mar 20	ETR	TAT-Delta	243	1,435.2	35,718	35,818	6.0	In orbit: North Atlantic Treaty Organization's military commsat
Kosmos 328	1970 22A	USSR	Mar 27	Plesetsk	A-2	6,300	89.7	203	299	72.9	Reentered 4/9/70
Kosmos 329	1970 23A	USSR	Apr 3	Plesetsk	A-2	5,700	88.8	198	228	81.3	Reentered 4/15/70
Kosmos 330	1970 24A	USSR	Apr 7	Plesetsk	C-1	875	95.2	514	543	74.1	Decayed 6/12/79
Nimbus 4	1970 25A	NASA	Apr 8	WTR	Thorad-Agena D	620	107.1	1,087	1,097	99.5	In orbit: 4th metsat; makes worldwide weather observations twice daily. Stage exploded 10/17, 300 pieces
TOPO 1	1970 25B	USA	Apr 8	WTR	Thorad-Agena D	18	106.9	1,083	1,085	99.7	In orbit: Army's SECOR-type tactical survey
Kosmos 331	1970 26A	USSR	Apr 8	Tyuratam	A-1	4,730	89.9	206	320	65.0	Reentered 4/16/70

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Vela 11	1970 27A	USAF	Apr 8	ETR	Titan IIIC	317	Current elements not maintained				In orbit: advanced nuclear detection
Vela 12	1970 27B	USAF	Apr 8	ETR	Titan IIIC	317	Current elements not maintained				In orbit: separated from Vela 11 by 180 degrees
Kosmos 332	1970 28A	USSR	Apr 11	Plesetsk	C-1	775	99.7	737	746	74	In orbit
Apollo 13	1970 29A	NASA	Apr 11	ETR	Saturn V	43,924	88.07	156	156	33.5	Recovered 4/17/70: failure of spacecraft oxygen tank #2 approx. 56 hrs into mission caused abort. James Lovell, Jack Swigert, Fred Haise took the crippled spacecraft around the moon, splashed down in the Pacific after 142 hrs, 53 mins
Kosmos 333	1970 30A	USSR	Apr 15	Plesetsk	A-2	6,300	89.11	219	239	88	Reentered 4/28/70
None	1970 31A	USAF	Apr 15	WTR	Titan IIIB-Agena D	3,000	89.70	130	388	110.9	Decayed 5/6/70
Intelsat III F-7	1970 32A	CSC	Apr 23	ETR	TAT-Delta	293	1,436.2	35,772	35,805	0.2*	In orbit: 7th in series stationed at 341 deg. e long. over Atlantic
Kosmos 334	1970 33A	USSR	Apr 23	Plesetsk	B-1	325	92.0	272	482	70.9	Decayed 8/9/70
China 1	1970 34A	PRC	Apr 24	Shuang Cheng Tzu	CZ-1	173	112.9	436	2,256	68.4	In orbit: 1st satellite launched by Peoples Republic of China
Kosmos 335	1970 35A	USSR	Apr 24	Kapustin Yar	B-1	295	91.0	250	401	48.4	Decayed 6/22/70
Kosmos 336	1970 36A	USSR	Apr 25	Plesetsk	C-1	50	115.4	1,462	1,484	74.0	In orbit: 1st 8-payload launch by USSR
Kosmos 337	1970 36B	USSR	Apr 25	Plesetsk	C-1	50	116.2	1,466	1,550	74.0	In orbit
Kosmos 338	1970 36C	USSR	Apr 25	Plesetsk	C-1	50	115.8	1,466	1,515	74.0	In orbit
Kosmos 339	1970 36D	USSR	Apr 25	Plesetsk	C-1	50	115.0	1,443	1,468	74.0	In orbit
Kosmos 340	1970 36E	USSR	Apr 25	Plesetsk	C-1	50	114.6	1,406	1,468	74.0	In orbit
Kosmos 341	1970 36F	USSR	Apr 25	Plesetsk	C-1	50	113.9	1,340	1,467	74.0	In orbit
Kosmos 342	1970 36G	USSR	Apr 25	Plesetsk	C-1	50	113.5	1,309	1,466	74.0	In orbit
Kosmos 343	1970 36H	USSR	Apr 25	Plesetsk	C-1	50	114.2	1,373	1,466	74.0	In orbit
Meteor 4	1970 37A	USSR	Apr 28	Plesetsk	A-1	3,800	97.3	625	710	81.2	In orbit: operational metsat
Kosmos 344	1970 38A	USSR	May 12	Plesetsk	A-1	4,730	89.8	202	329	72.9	Reentered 5/20/70

*Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 345	1970 39A	USSR	May 20	Tyuratam	A-1	4,730	89.0	192	270	51.7	Reentered 5/28/70
None	1970 40A	USAF	May 20	WTR	Thor-Agena D	2,000	88.6	162	247	83.0	Decayed 6/17/70
Soyuz 9	1970 41A	USSR	Jun 1	Tyuratam	A-2	6,500	88.4	176	227	51.6	Recovered 6/19/70: at the time, longest manned spaceflight (17 days, 16 hrs, 59 mins). Andrian Nikolayev, Vitali Sevastyanov aboard
Kosmos 346	1970 42A	USSR	Jun 10	Tyuratam	A-1	4,730	89.1	197	274	51.7	Reentered 6/17/70
Kosmos 347	1970 43A	USSR	Jun 12	Kapustin Yar	B-1	250	107.9	216	2,050	48.4	Decayed 11/7/70
Kosmos 348	1970 44A	USSR	Jun 13	Plesetsk	B-1	357	93.1	201	651	70.9	Decayed 7/25/70
Kosmos 349	1970 45A	USSR	Jun 17	Plesetsk	A-1	4,730	89.8	199	332	65.3	Reentered 6/25/70
None	1970 46A	USAF	Jun 19	ETR	Atlas-Agena D	700	Current elements not maintained				In orbit
Meteor 5	1970 47A	USSR	Jun 23	Plesetsk	A-1	3,300	101.9	821	879	81.2	In orbit: operational metsat
None	1970 48A	USAF	Jun 25	WTR	Titan IIIB-Agena D	3,000	89.7	129	389	108.8	Reentered 7/6/70
Molniya 1-14	1970 49A	USSR	Jun 26	Plesetsk	A-2-e	1,750	704.7	448	39,260	65.3	Decayed 2/16/76: commsat
Kosmos 350	1970 50A	USSR	Jun 26	Tyuratam	A-2	5,700	89.0	202	258	51.7	Reentered 7/8/70
Kosmos 351	1970 51A	USSR	Jun 27	Plesetsk	B-1	325	91.9	270	467	70.9	Decayed 10/13/70
Kosmos 352	1970 52A	USSR	Jul 7	Tyuratam	A-1	4,730	89.4	207	294	51.7	Reentered 7/15/70
Kosmos 353	1970 53A	USSR	Jul 9	Plesetsk	A-2	5,700	89.3	204	284	65.4	Reentered 7/21/70
None	1970 54A	USAF	Jul 23	WTR	Titan IIIB-Agena D	2,000	90.0	158	398	60.0	Decayed 8/19/70
Intelsat III F-8	1970 55A	CSC	Jul 23	ETR	TAT-Delta	270	1,043	19,400	36,030	13.3*	In orbit: failed to achieve synchronous orbit due to apogee motor malfunction; not operating
Kosmos 354	1970 56A	USSR	Jul 28	Tyuratam	F-1-r	5,000	87.5	134	178	49.6	Decayed 7/28/70: possible FOBS test
Interkosmos 3	1970 57A	USSR	Aug 7	Kapustin Yar	B-1	340	99.7	200	1,295	48.4	Decayed 12/6/70: international experiments from East European countries to study protons, electrons, and alpha particles

*Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 355	1970 58A	USSR	Aug 7	Plesetsk	A-1	4,730	89.7	199	322	65.4	Reentered 8/15/70
None	None	USSR	Aug 8	Tyuratam	D-1	–	–	–	–	–	Kosmos failure
Kosmos 356	1970 59A	USSR	Aug 10	Plesetsk	B-1	357	92.6	231	573	81.9	Decayed 10/2/70
Venera 7	1970 60A	USSR	Aug 17	Tyuratam	A-2-e	1,180	Flight time: 120 days				Decayed 12/15/70: lander capsule tx 23 mins
None	1970 61A	USAF	Aug 18	WTR	Titan IIIB-Agena D	–	89.6	151	365	110.9	Decayed 9/3/70
Skynet II	1970 62A	UK	Aug 19	ETR	TAT-Delta	243	636.5	270	36,041	28.0*	In orbit: failed to achieve usable orbit; apogee motor failure; 2nd UK military communications satellite
Kosmos 357	1970 63A	USSR	Aug 19	Plesetsk	B-1	325	92.0	272	476	70.9	Decayed 11/24/70
Kosmos 358	1970 64A	USSR	Aug 20	Plesetsk	C-1	875	93.9	425	431	74.0	In orbit
Kosmos 359	1970 65A	USSR	Aug 22	Tyuratam	A-2-e	1,180	95.5	208	890	51.1	Decayed 11/6/70: possible Venus probe attempt
None	1970 66A	USAF	Aug 26	WTR	Thorad-Agena D	2,000	94.5	484	504	74.9	Decayed 3/26/75
None	1970 67A	NASA	Aug 27	WTR	Scout	18	106.8	949	1,209	90.2	In orbit: Navy navigation
Kosmos 360	1970 68A	USSR	Aug 29	Tyuratam	A-2	6,300	89.6	209	305	64.9	Reentered 9/8/70
None	1970 69A	USAF	Sep 1	WTR	Atlas-Agena D	–	Current elements not maintained				In orbit
None	1970 70A	USAF	Sep 3	WTR	Thor-Burner II	–	101.9	764	874	99.1	Reentered 9/21/70
Kosmos 361	1970 71A	USSR	Sep 8	Plesetsk	A-2	6,300	89.5	209	298	72.8	Reentered 9/21/70
Luna 16	1970 72A	USSR	Sep 12	Tyuratam	D-1-e	5,600	–	–	–	–	Reentered 9/24/70: unmanned moon lander touched down on Sea of Fertility 9/20/70; returned lunar soil samples
Kosmos 362	1970 73A	USSR	Sep 16	Plesetsk	B-1	300	95.5	270	829	70.9	Decayed 10/13/71
Kosmos 363	1970 74A	USSR	Sep 17	Tyuratam	A-2	5,700	89.5	208	294	65.0	Reentered 9/29/70
Kosmos 364	1970 75A	USSR	Sep 22	Plesetsk	A-2	6,300	89.6	202	297	65.4	Reentered 10/2/70
Kosmos 365	1970 76A	USSR	Sep 25	Tyuratam	F-1-r	5,000	87.7	133	174	49.5	Reentered 9/25/70: possible FOBS test
Molniya 1-15	1970 77A	USSR	Sep 29	Plesetsk	A-2-e	1,750	70.6	480	39,300	65.5	Decayed 3/20/76: domestic communications

*Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 366	1970 78A	USSR	Oct 1	Tyuratam	A-2	5,700	89.4	204	295	64.9	Reentered 10/13/70
Kosmos 367	1970 79A	USSR	Oct 3	Tyuratam	F-l-m	4,540	104.5	921	1,018	65.3	In orbit. Rorsat
Kosmos 368	1970 80A	USSR	Oct 8	Tyuratam	A-2	5,900	90.5	204	400	64.9	Reentered 10/14/70
Kosmos 369	1970 81A	USSR	Oct 8	Plesetsk	B-1	325	92.3	269	506	70.9	Decayed 1/22/71
Kosmos 370	1970 82A	USSR	Oct 9	Tyuratam	A-2	6,300	89.4	202	288	64.9	Reentered 10/22/70
Kosmos 371	1970 83A	USSR	Oct 12	Plesetsk	C-1	775	99.6	737	741	74.0	In orbit
Interkosmos 4	1970 84A	USSR	Oct 14	Kapustin Yar	B-1	320	93.3	255	649	43.3	Reentered 1/17/71: int'l experiments provided by Czechoslovakia, East Germany and USSR to study solar ultraviolet and X-radiation effects
Meteor 6	1970 85A	USSR	Oct 15	Plesetsk	A-1	3,800	96.4	565	574	81.2	In orbit: operational metsat
Kosmos 372	1970 86A	USSR	Oct 16	Plesetsk	C-1	750	100.6	773	797	74.1	In orbit
Kosmos 373	1970 87A	USSR	Oct 20	Tyuratam	F-1-m	3,320	94.7	472	544	62.9	Decayed 3/8/80
Zond 8	1970 88A	USSR	Oct 20	Tyuratam	D-1-e	5,375	–	–	–	–	Recovered 10/27/70: passed moon
Kosmos 374	1970 89A	USSR	Oct 23	Tyuratam	F-1-m	3,320	109.9	556	1,785	63.0	ASAT warhead, 45 pieces in orbit
None	1970 90A	USAF	Oct 23	WTR	Titan IIIB-Agena D	3,000	89.8	135	396	111.0	Reentered 11/11/70
Kosmos 375	1970 91A	USSR	Oct 30	Tyuratam	F-1-m	3,320	111.6	550	2,042	62.8	ASAT warhead, 31 pieces in orbit
Kosmos 376	1970 92A	USSR	Oct 30	Plesetsk	A-2	6,300	89.4	207	286	65.3	Reentered 11/12/70
None	1970 93A	USAF	Nov 6	ETR	Titan IIIC	820	1,198.1	25,937	36,040	14.7	In orbit
OFO-1	1970 94A	NASA	Nov 9	WI	Scout	133	92.5	304	518	37.4	Recovered 5/9/71; Orbiting Frog Otolith: 6-day flight, all flight objectives met
Radiation Meteoroid	1970 94B	NASA	Nov 9	WI	Scout	46	92.6	21	322	37.4	Decayed 2/7/71
Luna 17	1970 95A	USSR	Nov 10	Tyuratam	D-1-e	5,600	–	–	–	–	Landed on moon 11/17/70: unmanned moon rover
Kosmos 377	1970 96A	USSR	Nov 11	Tyuratam	A-2	5,700	89.40	204	286	64.9	Reentered 11/23/70
Kosmos 378	1970 97A	USSR	Nov 17	Plesetsk	B-1	710	104.8	234	1,742	74.0	Decayed 8/17/72

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1970 98A	USAF	Nov 18	WTR	Thorad-Agena D	2,000	88.7	185	232	82.9	Decayed 12/11/70
None	1970 98B	USAF	Nov 18	WTR	Thorad-Agena D	60	94.6	487	511	83.2	Decayed 9/14/77
Kosmos 379	1970 99A	USSR	Nov 24	Tyuratam	D-1	7,495	126.8	192	1,210	51.6	Decayed 9/21/83. Manned lunar related?
Kosmos 380	1970 100A	USSR	Nov 24	Plesetsk	B-1	250	102.1	199	1,520	81.9	Decayed 6/17/71
Molniya 1-16	1970 101A	USSR	Nov 27	Plesetsk	A-2-e	1,750	707.0	471	39,356	65.4	Decayed 11/25/75: domestic communications
OAO-B	None	NASA	Nov 30	ETR	Atlas-Centaur	2,121	–	–	–	–	Failed to orbit: launch failure
Kosmos 381	1970 102A	USSR	Dec 2	Plesetsk	C-1	710	104.8	961	1,008	74.0	In orbit
Kosmos 382	1970 103A	USSR	Dec 2	Tyuratam	D-1	10,380	171.0	2,464	5,189	55.9	In orbit. Manned lunar related?
Kosmos 383	1970 104A	USSR	Dec 3	Plesetsk	A-2	6,800	89.3	204	279	65.4	Reentered 12/16/70
Kosmos 384	1970 105A	USSR	Dec 10	Plesetsk	A-2	5,900	89.4	203	292	72.8	Reentered 12/22/70
NOAA-1	1970 106A	NASA	Dec 11	WTR	Long Tank TAT-Delta	306	114.8	1,422	1,471	101.8	In orbit: National Oceanic & Atmospheric Administration world-wide weather observation
Explorer 42	1970 107A	NASA/ Italy	Dec 12	San Marco	Scout	143	95.3	522	563	3.0	Decayed 4/5/79: Small Astronomy Satellite (SAS-1), also named Uhuru; 1st U.S. satellite launched by another country
Kosmos 385	1970 108A	USSR	Dec 12	Plesetsk	C-1	680	104.6	974	979	74.0	In orbit
PEOLE 1	1970 109A	France	Dec 12	Kourou	Diamant B	70	98.4	517	747	15.0	Decayed 6/16/80: gathered data from a meteorological balloon system to be utilized for ECOLE
Kosmos 386	1970 110A	USSR	Dec 15	Tyuratam	A-2	6,300	89.4	215	276	89.2	Reentered 12/28/70
Kosmos 387	1970 111A	USSR	Dec 16	Plesetsk	C-1	875	95.3	528	538	74.0	Decayed 1/19/80
Kosmos 388	1970 112A	USSR	Dec 18	Plesetsk	B-1	325	92.3	271	505	70.9	Decayed 5/10/71
Kosmos 389	1970 113A	USSR	Dec 18	Plesetsk	A-1	3,800	97.8	598	679	81.2	In orbit
Molniya 1-17	1970 114A	USSR	Dec 25	Tyuratam	A-2-e	1,750	711.8	495	39,565	64.9	Decayed 12/22/75: domestic communications
Kosmos 390	1971 1A	USSR	Jan 12	Tyuratam	A-2	6,300	80.28	204	275	65.01	Reentered 1/25/71
Kosmos 391	1971 2A	USSR	Jan 14	Plesetsk	B-1	300	95.3	256	641	70.9	Decayed 2/21/72
Meteor 7	1971 3A	USSR	Jan 20	Plesetsk	A-1	3,800	96.8	586	603	81.2	In orbit

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 392	1971 4A	USSR	Jan 21	Tyuratam	A-2	5,700	89.3	204	278	64.9	Reentered 2/2/71
None	1971 5A	USAF	Jan 21	WTR	Titan IIIB-Agena D	3,000	90.0	139	418	110.8	Reentered 2/9/71
Intelsat IV F-2	1971 6A	CSC	Jan 26	ETR	Atlas-Centaur	706	1,450.8	35,801	36,349	0.6°	In synchronous orbit: over Atlantic at 24.5 deg. w long.; commercial service began 3/26/71; 1st launch of 4th-generation commercial communications satellite
Kosmos 393	1971 7A	USSR	Jan 26	Plesetsk	B-1	325	92.1	272	485	71.0	Decayed 6/16/71
Apollo 14	1971 8A	NASA	Jan 31	ETR	Saturn V	44,456	88.0	186	186	32.5	Reentered 2/9/71: Alan Shepard, Edgar Mitchell landed on moon 2/5/71 at Fra Mauro. Stuart Roosa remained in command module. Mission duration 9 days, 1 mn, 57 sec
ALSEP 14		NASA					17.46 w, 3.67 s (lunar surface)				Science Station data until 10/1/77
NATO-2	1971 9A	NATO	Feb 3	ETR	TAT-Delta	243	1,435.8	30,496	41,063	8.7	In orbit: 2nd North Atlantic Treaty Organization military communications satellite
Kosmos 394	1971 10A	USSR	Feb 9	Plesetsk	F-1-m	750	96.1	550	578	65.8	In orbit
Tansei	1971 11A	Japan	Feb 16	Uchinoura	Mu-4S	62	106.1	987	1,108	29.7	In orbit: tx data for one week
None	1971 12A	USAF	Feb 17	WTR	Thor-Burner II	195	100.6	755	817	98.3	In orbit
Calsphere 3	1971 12C	USAF	Feb 17	WTR	Thor-Burner II	1	98.8	634	665	98.4	In orbit: radar calibration sphere
Calsphere 4	1971 12D	USAF	Feb 17	WTR	Thor-Burner II	1	98.7	623	653	98.4	In orbit: radar calibration sphere
Calsphere 5	1971 12E	USAF	Feb 17	WTR	Thor-Burner II	1	99.1	658	698	98.4	In orbit: radar calibration sphere
Kosmos 395	1971 13A	USSR	Feb 17	Plesetsk	C-1	875	95.4	529	546	74.0	Decayed 4/6/80
None	None	USAF	Feb 17	WTR	Thor-Agena	2,000	–	–	–	–	Failed to orbit
Kosmos 396	1971 14A	USSR	Feb 18	Plesetsk	A-2	6,300	89.4	205	286	65.4	Reentered 3/3/71
Kosmos 397	1971 15A	USSR	Feb 25	Tyuratam	F-1-m	3,320	113.3	561	2,197	65.7	ASAT warhead, 82 pieces in orbit
Kosmos 398	1971 16A	USSR	Feb 26	Tyuratam	D-1	7,255	168.2	201	7,250	51.6	In orbit. Manned lunar related?

°Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 399	1971 17A	USSR	Mar 3	Tyuratam	A-2	6,300	89.3	201	283	65.0	Reentered 3/17/71
China 2	1971 18A	PRC	Mar 3	Shuang Cheng Tzu	CZ-1	221	106.1	268	1,830	69.9	Decayed 6/17/79: 2nd launch by PRC
Explorer 43 (IMP 1)	1971 19A	NASA	Mar 13	ETR	Long Tank Thor-Delta	288	5628	353	204,577	28.7	Decayed 10/2/74: 9th in Interplanetary Monitoring Platform series; studied earth's magnetosphere
Kosmos 400	1971 20A	USSR	Mar 18	Plesetsk	F-1-m	750	104.9	981	1,001	65.8	In orbit
None	1971 21A	USAF	Mar 21	WTR	Titan IIIB-Agena D	700	Current elements not maintained				In orbit
None	1971 22A	USAF	Mar 24	WTR	Long Tank Thorad-Agena D	2,000	88.5	157	246	81.5	Decayed 4/12/71
Kosmos 401	1971 23A	USSR	Mar 27	Plesetsk	A-2	6,300	89.2	185	290	72.8	Reentered 4/9/71
ISIS 2	1971 24A	Can	Apr 1	WTR	Thor-Delta	264	113.5	1,354	1,423	88.2	In orbit: 3rd in a series of international ionospheric studiess
Kosmos 402	1971 25A	USSR	Apr 1	Tyuratam	C-1	4,540	104.9	948	1,030	65.0	In orbit
Kosmos 403	1971 26A	USSR	Apr 2	Plesetsk	A-2	5,700	88.9	214	230	81.3	Reentered 4/14/71
Kosmos 404	1971 27A	USSR	Apr 4	Tyuratam	F-1-r	3,320	94.2	802	1,010	65.1	Decayed 4/4/71
Kosmos 405	1971 28A	USSR	Apr 7	Plesetsk	A-1	3,800	97.7	637	641	81.2	In orbit
Kosmos 406	1971 29A	USSR	Apr 14	Plesetsk	A-2	6,300	89.1	217	246	81.2	Reentered 4/24/71
Tournesol 1	1971 30A	France	Apr 15	Kourou	Diamant B	96	96.1	457	697	46.3	Decayed 1/28/80
Meteor 8	1971 31A	USSR	Apr 17	Plesetsk	A-1	3,800	95.8	512	540	81.2	In orbit: operational metsat
Salyut 1	1971 32A	USSR	Apr 19	Tyuratam	D-1	18,500	88.5	200	210	51.5	Reentered 10/11/71: prototype manned space station
None	1971 33A	USAF	Apr 22	WTR	Titan IIIB-Agena D	3,000	89.8	132	401	110.9	Reentered 5/13/71
Soyuz 10	1971 34A	USSR	Apr 23	Tyuratam	A-2	6,575	89.2	209	258	51.6	Recovered 4/24/71: Vladimir Shatalov, Alexei Yeliseyev, Nikolai Rukavishnikov docked with Salyut 1, 4/24. Failed to board

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 407	1971 35A	USSR	Apr 23	Plesetsk	C-1	750	100.8	780	809	74.0	In orbit
San Marco 3	1971 36A	Italy	Apr 24	San Marco	Scout	164	93.8	222	718	3.2	Decayed 11/29/71: 3rd Italian atmospheric satellite
Kosmos 408	1971 37A	USSR	Apr 24	Plesetsk	B-1	250	102.0	200	1,514	81.8	Decayed 12/29/71
Kosmos 409	1971 38A	USSR	Apr 28	Plesetsk	C-1	600	109.3	1,175	1,209	74.0	In orbit
None	1971 39A	USAF	May 5	ETR	Titan IIIC	820	Current elements not maintained				In orbit
Kosmos 410	1971 40A	USSR	May 6	Tyuratam	A-2	5,900	89.3	205	280	64.9	Reentered 5/18/71
Kosmos 411	1971 41A	USSR	May 7	Plesetsk	C-1	50	113.8	1,314	1,489	74.0	In orbit
Kosmos 412	1971 41B	USSR	May 7	Plesetsk	C-1	50	116.1	1,477	1,534	74.0	In orbit
Kosmos 413	1971 41C	USSR	May 7	Plesetsk	C-1	50	115.7	1,472	1,506	74.0	In orbit
Kosmos 414	1971 41D	USSR	May 7	Plesetsk	C-1	50	115.1	1,426	1,491	74.0	In orbit
Kosmos 415	1971 41E	USSR	May 7	Plesetsk	C-1	50	115.4	1,449	1,498	74.0	In orbit
Kosmos 416	1971 41F	USSR	May 7	Plesetsk	C-1	50	114.4	1,369	1,490	74.0	In orbit
Kosmos 417	1971 41G	USSR	May 7	Plesetsk	C-1	50	114.1	1,341	1,490	74.0	In orbit
Kosmos 418	1971 41H	USSR	May 7	Plesetsk	C-1	50	114.8	1,398	1,490	74.0	In orbit
Mariner H	None	USAF	May 8	ETR	Atlas-Centaur	996	–	–	–	–	Failed to achieve orbit: 2nd stage failure
Kosmos 419	1971 42A	USSR	May 10	Tyuratam	D-1-e	4,650	87.4	145	159	51.5	Decayed 5/12/71. Mars probe failure
Kosmos 420	1971 43A	USSR	May 18	Tyuratam	A-2	6,300	89.0	199	257	51.7	Reentered 5/29/71
Kosmos 421	1971 44A	USSR	May 19	Plesetsk	B-1	325	91.8	273	469	70.9	Decayed 11/8/71
Mars 2	1971 45A	USSR	May 19	Tyuratam	D-1-e	4,650		–	–	–	1st Soviet Mars landing 11/27/71
Kosmos 422	1971 46A	USSR	May 22	Plesetsk	C-1	680	105.0	982	1,005	74.0	In orbit
Kosmos 423	1971 47A	USSR	May 27	Plesetsk	B-1	325	92.1	272	487	71.0	Decayed 11/26/71
Kosmos 424	1971 48A	USSR	May 28	Plesetsk	A-2	6,300	89.3	204	282	65.4	Reentered 6/10/71
Mars 3	1971 49A	USSR	May 28	Tyuratam	D-1-e	4,643	–	–	–	–	Mars probe, landed 12/2

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 425	1971 50A	USSR	May 29	Plesetsk	C-1	820	95.2	506	553	74.0	Decayed 1/15/80
Mariner 9	1971 51A	NASA	May 30	ETR	Atlas-Centaur	974		Areocentric orbit			Mars probe, 11/13 orbit
Kosmos 426	1971 52A	USSR	Jun 4	Plesetsk	C-1	680	104.2	376	1,547	74.0	In orbit
Soyuz 11	1971 53A	USSR	Jun 6	Tyuratam	A-2	6,790	88.4	189	209	51.5	Reentered 6/29/71: Georgi Dobrovolsky, Vladislav Volkov, Viktor Patsayev died of asphixiation upon reentry; docked with Salyut 1 6/7 to 6/29, transferred crew
None	1971 54A	USAF	Jun 8	WTR	Thor-Burner II	260	90.5	545	581	90.2	Decayed 1/31/82
Kosmos 427	1971 55A	USSR	Jun 11	Plesetsk	A-2	6,300	89.7	204	314	72.8	Reentered 6/23/71
None	1971 56A	USAF	Jun 15	WTR	Titan IIID	13,300	114.3	184	300	96.4	Decayed 8/6/71: 1st known launch of Titan IIID
None		USSR	Jun 24	Tyuratam	G-1						2nd launch of Saturn-class booster, failed
Kosmos 428	1971 57A	USSR	Jun 24	Tyuratam	A-2-e	5,900	89.0	206	257	51.7	Decayed 7/6/71
Explorer 44 (Solrad 10)	1971 58A	USN/ NASA	Jul 8	WI	Scout	118	95.2	433	632	51.0	Decayed 12/15/79: 3rd in solar radiation series, measuring solar electromagnetic and stellar radiation
Meteor 9	1971 59A	USSR	Jul 16	Plesetsk	A-1	3,800	96.0	538	554	81.2	In orbit: operational metsat
None	1971 60A	USAF	Jul 16	WTR	Thorad-Agena D	2,000	94.5	488	508	75.0	Decayed 8/31/78
Kosmos 429	1971 61A	USSR	Jul 20	Tyuratam	A-2	6,300	88.9	202	252	51.7	Reentered 8/2/71
Kosmos 430	1971 62A	USSR	Jul 23	Plesetsk	A-2	6,300	89.5	199	305	65.4	Reentered 8/5/71
Apollo 15	1971 63A	NASA	Jul 26	ETR	Saturn V	46,723	87.7	169	173	32.5	Recovered 8/7/71: David Scott, James Irwin landed on moon, 7/30 at Hadley Rille near Appenine Range. Alfred Worden remained aboard command module. Mission duration 12 days, 7 hrs, 11 mn
ALSEP 15							3.66 e, 26.11 n (lunar surface)				Science station data until 10/1/77

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
P&F Subsatellite	1971 63D	NASA	Aug 4	Apollo 15		36		Selenocentric Orbit			1st Subsatellite launched from a manned spacecraft in space. Data until 7/72
Molniya 1-18	1971 64A	USSR	Jul 28	Plesetsk	A-2-e	1,750	704.9	468	39,254	65.3	Decayed 7/19/77: domestic communications
Kosmos 431	1971 65A	USSR	Jul 30	Tyuratam	A-2	5,700	88.9	194	257	51.7	Reentered 8/11/71
Kosmos 432	1971 66A	USSR	Aug 5	Tyuratam	A-2	6,300	88.9	941	259	51.7	Reentered 8/18/71
OV1 20	1971 67A	USA	Aug 7	ETR	Atlas F	70	106.2	133	1,957	92.0	Decayed 8/28/71
OV1 21	1971 67B	USA	Aug 7	ETR	Atlas F	70	101.8	779	908	87.6	In orbit
Cannonball 2	1971 67C	USA	Aug 7	ETR	Atlas F	364	106.1	133	1,970	92.0	Decayed 1/31/72
Rigid Sphere 2	1971 67E	USA	Aug 7	ETR	Atlas F	37	101.5	771	881	87.6	In orbit
Balloon (Mylar)	1971 67F	USA	Aug 7	ETR	Atlas F	.8	102.0	777	914	87.6	Decayed 6/11/72
Grid Sphere 2	1971 67G	USA	Aug 7	ETR	Atlas F	4	102.0	783	915	87.6	Decayed 4/14/79
Grid Sphere 1	1971 67H	USA	Aug 7	ETR	Atlas F	6.2	101.8	777	920	87.6	Decayed 11/2/79
Rigid Sphere 1	1971 67P	USA	Aug 7	ETR	Atlas F	1.6	98.3	786	917	87.6	Decayed 9/1/81
Kosmos 433	1971 68A	USSR	Aug 8	Tyuratam	F-1-r	–	98.3	122	299	49.4	Decayed 8/10/71
Kosmos 434	1971 69A	USSR	Aug 12	Tyuratam	A-2	7,000	112.9	188	11,804	51.5	Decayed 8/12/81. Manned lunar related?
None	1971 70A	USAF	Aug 12	WTR	Titan IIIB-Agena D	3,000	90.1	137	424	111.0	Reentered 9/3/71
EOLE 1	1971 71A	France	Aug 16	WI	Scout	84	100.3	664	870	50.1	In orbit: experimental atmospheric weather; returned data for 5 months
Kosmos	None	USSR	Aug 19	Plesetsk	A-2						Failed to orbit
Kosmos 435	1971 72A	USSR	Aug 27	Plesetsk	B-1	325	92.0	271	482	70.9	Decayed 1/28/72
Luna 18	1971 73A	USSR	Sep 2	Tyuratam	D-1-e	5,600	–	–	–	–	Crashed on moon 9/11/71 after 54 orbits. Flight time 8.85 days
Kosmos 436	1971 74A	USSR	Sep 7	Plesetsk	C-1	875	95.0	509	545	74.0	Decayed 1/4/80
Kosmos 437	1971 75A	USSR	Sep 10	Plesetsk	C-1	875	95.3	519	548	74.0	Decayed 3/29/80

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1971 76A	USAF	Sep 10	WTR	LTTAT-Agena D	2,000	88.4	156	244	74.9	Decayed 10/5/71
None	1971 76B	USAF	Sep 10	WTR	LTTAT-Agena D	60	94.6	492	507	75.1	Decayed 2/3/76
Kosmos 438	1971 77A	USSR	Sep 14	Plesetsk	A-2	6,300	89.5	208	296	65.4	Reentered 9/27/71
Kosmos 439	1971 78A	USSR	Sep 21	Plesetsk	A-2	5,700	89.4	207	284	65.4	Reentered 10/2/71
Kosmos 440	1971 79A	USSR	Sep 24	Plesetsk	B-1	300	95.2	272	785	71.0	Decayed 10/29/72
Shinsei	1971 80A	Japan	Sep 28	Kagoshima	Mu 4S	65	113.1	872	1,870	32.1	In orbit: Japanese scientific satellite
Kosmos 441	1971 81A	USSR	Sep 28	Tyuratam	A-2	6,300	89.2	204	268	65.2	Reentered 10/10/71
Luna 19	1971 82A	USSR	Sep 28	Tyuratam	D-1-e	5,600		Selenocentric orbit			Lunar photography mission
OSO 7	1971 83A	NASA	Sep 29	ETR	LTTAD	635	93.4	323	571	33.1	Decayed 7/9/74: solar science
TETR-D	1971 83B	NASA	Sep 29	ETR	LTTAD	20	94.1	398	572	33.0	Decayed 9/21/78: test and training for Apollo communications
Kosmos 442	1971 84A	USSR	Sep 29	Plesetsk	A-2	6,300	89.4	182	313	72.8	Reentered 10/12/71
Kosmos 443	1971 85A	USSR	Oct 7	Plesetsk	A-2	5,900	89.5	204	301	65.4	Reentered 10/19/71
Kosmos 444	1971 86A	USSR	Oct 13	Plesetsk	C-1	50	114.1	1,319	1,507	74.0	In orbit
Kosmos 445	1971 86B	USSR	Oct 13	Plesetsk	C-1	50	114.4	1,347	1,510	74.0	In orbit
Kosmos 446	1971 86C	USSR	Oct 13	Plesetsk	C-1	50	114.8	1,378	1,510	74.0	In orbit
Kosmos 447	1971 86D	USSR	Oct 13	Plesetsk	C-1	50	115.1	1,408	1,513	74.0	In orbit
Kosmos 448	1971 86E	USSR	Oct 13	Plesetsk	C-1	50	115.5	1,438	1,515	74.0	In orbit
Kosmos 449	1971 86F	USSR	Oct 13	Plesetsk	C-1	50	116.2	1,481	1,539	74.0	In orbit
Kosmos 450	1971 86G	USSR	Oct 13	Plesetsk	C-1	50	115.9	1,460	1,527	74.0	In orbit
Kosmos 451	1971 86H	USSR	Oct 13	Plesetsk	C-1	50	116.6	1,487	1,571	74.0	In orbit
None	1971 87A	USAF	Oct 14	WTR	Thor-Burner II	195	101.4	782	865	99.1	In orbit
Kosmos 452	1971 88A	USSR	Oct 14	Tyuratam	A-2	6,300	89.0	198	260	64.9	Reentered 10/27/71

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
STP	1971 89A	USAF	Oct 17	WTR	Thorad-Agena D	1,500	100.2	748	780	92.7	In orbit: USAF advanced space technology experiments Space Test Program (former SESP)
Kosmos 453	1971 90A	USSR	Oct 19	Plesetsk	B-1	325	92.1	271	493	71.00	Decayed 3/19/72
NOAA 2 (ITOS B)	1971 91A	NASA	Oct 21	WTR	Delta N	308	102.5	279	1,474	102.6	2nd stage decayed 7/21/72: satellite failed to achieve orbit
None	1971 92A	USAF	Oct 23	WTR	Titan IIIB-Agena D	3,000	90.0	134	416	110.94	Reentered 11/17/71
Prospero	1971 93A	UK	Oct 28	Woomera	Black Arrow	66	105.6	537	1,482	82.1	In orbit
Kosmos 454	1971 94A	USSR	Nov 2	Plesetsk	A-2	6,300	89.1	203	262	65.4	Reentered 11/16/71
DSCS II-A1	1971 95A	USAF	Nov 3	ETR	Titan IIIC	520	1,436.3	35,773	35,806	5.3	In orbit: 2nd generation military Defense Satellite Communications System
DSCS II-A2	1971 95B	USAF	Nov 3	ETR	Titan IIIC	520	1,435.7	35,280	36,275	5.2	In orbit: 2nd generation military Defense Satellite Communications System
Explorer 45	1971 96A	NASA	Nov 15	San Marco	Scout	52	325.1	272	18,149	3.6	In orbit: 2nd US launch by Italian crew; examined energetic particles and studied earth's magnetosphere
Kosmos 455	1971 97A	USSR	Nov 17	Plesetsk	B-1	325	92.1	272	491	70.9	Decayed 4/9/72
Kosmos 456	1971 98A	USSR	Nov 19	Plesetsk	A-2	6,300	89.1	178	304	72.8	Reentered 12/2/71
Kosmos 457	1971 99A	USSR	Nov 20	Plesetsk	C-1	600	109.4	1,181	1,216	74.0	In orbit
Molniya 2	1971 100A	USSR	Nov 24	Plesetsk	A-2-e	1,800	712.0	517	39,554	65.4	Decayed 5/10/76: 1st launch of Molniya 2 series
Kosmos 458	1971 101A	USSR	Nov 29	Plesetsk	B-1	325	92.2	272	497	70.0	Decayed 4/20/72
Kosmos 459	1971 102A	USSR	Nov 29	Plesetsk	F-1-m	750	89.4	224	260	65.0	Decayed 12/27/71
Kosmos 460	1971 103A	USSR	Nov 30	Plesetsk	C-1	875	95.2	528	532	74.0	Decayed 3/5/80
Interkosmos 5	1971 104A	USSR	Dec 2	Kapustin Yar	B-1	340	98.5	198	1,181	48.5	Decayed 4/7/72: USSR and Czechoslovakian instruments to study effects of solar activity on near-earth radiation
Kosmos 461	1971 105A	USSR	Dec 2	Plesetsk	C-1	680	94.61	486	511	69.23	Decayed 2/21/79
Kosmos 462	1971 106A	USSR	Dec 3	Tyuratam	F-1-m	3,320	105.43	230	1,800	65.75	ASAT warhead, 29 pieces

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Urbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	None	USAF	Dec 4	ETR	Atlas-Agena D	700	–	–	–	–	Failed to orbit: 1st stage booster malfunction
Diamant B-4 (D-2A polar)	None	France	Dec 5	Kourou	Diamant B	97	–	–	–	–	Launch failure of Diamant B 2nd stage
Kosmos 463	1971 107A	USSR	Dec 6	Tyuratam	A-2	6,300	89.24	202	273	64.97	Reentered 12/11/71
Kosmos 464	1971 108A	USSR	Dec 10	Plesetsk	A-2	6,300	90.34	206	375	72.75	Reentered 12/16/71
Ariel 4 (UK-4)	1971 109A	UK	Dec 11	WTR	Scout	99.5	95.35	477	593	82.99	Decayed 12/12/78: 4th in coop program (NASA/UK); 4 British and 1 American experiment to survey the ionosphere and certain radio signals for 1 year
None	1971 110A	USAF	Dec 14	WTR	Thorad-Agena D	700	Elements not available				In orbit with 3 subsatellites
Kosmos 465	1971 111A	USSR	Dec 15	Plesetsk	C-1	680	104.8	965	1,005	74.0	In orbit
Kosmos 466	1971 112A	USSR	Dec 16	Tyuratam	A-2	6,300	89.4	209	280	65	Reentered 12/27/71
Kosmos 467	1971 113A	USSR	Dec 17	Plesetsk	B-1	325	92.0	267	472	71	Decayed 4/18/72
Kosmos 468	1971 114A	USSR	Dec 17	Plesetsk	C-1	750	100.6	776	798	74	In orbit
Molniya 1-19	1971 115A	USSR	Dec 19	Plesetsk	A-2-e	1,750	703	499	39,139	65.5	Decayed 4/13/77
Intelsat IV F-3	1971 116A	CSC	Dec 20	ETR	Atlas-Centaur	1,410	1,454.6	35,649	36,645	3.9	In orbit: over Atlantic, 2nd in Intelsat IV series
Kosmos 469	1971 117A	USSR	Dec 25	Tyuratam	A-2	4,540	104.7	929	1,028	64.5	In orbit
Kosmos 470	1971 118A	USSR	Dec 27	Plesetsk	A-2	5,900	89.1	194	260	65.40	Reentered 1/6/72
Oreol (Aureole)	1971 119A	France-USSR	Dec 27	Plesetsk	C-1	630	112.2	391	2,184	74.0	In orbit: studied upper atmosphere in high latitudes and the polar lights; 1st user satellite launched by USSR with French assistance
Meteor 10	1971 120A	USSR	Dec 29	Plesetsk	A-1	3,300	102.5	835	922	81.3	In orbit
Kosmos 471	1972 1A	USSR	Jan 12	Tyuratam	A-2	6,300	89.5	201	316	65	Reentered 1/25/72
None	1972 2A	USAF	Jan 20	WTR	Titan IIID	13,300	89.4	157	331	97	Reentered 2/29/72

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1972 2D	USAF	Jan 20	WTR	Titan IIID	60	94.9	472	549	96.6	Decayed 4/7/79
Intelsat IV F-4	1972 3A	CSC	Jan 23	ETR	Atlas-Centaur	1,410	1,442.6	35,897	35,931	4.3	In orbit: stationed above Gilbert Islands in central Pacific; 3rd in Intelsat IV series
Kosmos 472	1972 4A	USSR	Jan 25	Plesetsk	B-1	250	102.2	194	1,536	82	Decayed 8/18/72
HEOS A2	1972 5A	ESRO	Jan 31	WTR	Delta	123	7,477.1	405	240,164	90.2	Decayed 8/2/74: particles and fields
Kosmos 473	1972 6A	USSR	Feb 3	Tyuratam	A-2	5,700	89.7	209	333	65	Reentered 2/15/72
Luna 20	1972 7A	USSR	Feb 14	Tyuratam	D-1-e	5,600	Lunar Trajectory				Recovered 2/25/72: returned lunar soil sample
None		US	Feb 16	WTR	Titan IIIB-Agena D	3,000					Failure
Kosmos 474	1972 8A	USSR	Feb 16	Tyuratam	A-2	6,300	88.9	207	347	65	Reentered 2/29/72
Kosmos 475	1972 9A	USSR	Feb 25	Plesetsk	C-1	680	104.7	963	996	74	In orbit
None	1972 10A	USAF	Mar 1	ETR	Titan IIIC	820	Current elements not maintained				In orbit
Kosmos 476	1972 11A	USSR	Mar 1	Plesetsk	A-1	3,800	95.5	539	550	81.2	In orbit
Pioneer 10	1972 12A	NASA	Mar 3	ETR	Atlas-Centaur	259	Solar system escape				In orbit: Jupiter encounter 12/73: 1st earth-made object to escape the solar system 6/13/83
Kosmos 477	1972 13A	USSR	Mar 4	Plesetsk	A-2	5,900	89.6	212	328	72.9	Reentered 3/16/72
TD-1A	1972 14A	ESRO	Mar 12	WTR	Delta	472	95	531	539	97.5	Decayed 1/9/80: investigated high-energy emissions
Kosmos 478	1972 15A	USSR	Mar 15	Plesetsk	A-2	6,300	89.5	213	319	65.4	Reentered 3/28/72
None	1972 16A	USAF	Mar 17	WTR	Titan IIIB-Agena	3,000	89.9	131	409	110.9	Decayed 4/11/72
Kosmos 479	1972 17A	USSR	Mar 22	Plesetsk	C-1	875	95.2	514	514	74	Decayed 4/13/80
None	1972 18A	USAF	Mar 24	WTR	Thor Burner II	195	101.5	787	868	99.1	In orbit
Kosmos 480	1972 19A	USSR	Mar 25	Plesetsk	C-1	600	109.1	1,170	1,197	83	In orbit
Kosmos 481	1972 20A	USSR	Mar 25	Plesetsk	B-1	375	92.4	269	514	71	Decayed 9/2/72
Venera 8	1972 21A	USSR	Mar 27	Tyuratam	A-2-e	1,180	Venus trajectory				Landed Venus 7/22/72, transmitted surface data
Meteor 11	1972 22A	USSR	Mar 30	Plesetsk	A-1	3,300	102.4	858	883	81.2	In orbit: Metsat

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 482	1972 23A	USSR	Mar 31	Tyuratam	A-2-e	1,180	105.8	189	1,869	52	Decayed 5/5/81: probable Venus failure
Kosmos 483	1972 24A	USSR	Apr 3	Plesetsk	A-2	6,300	89.8	212	345	72.9	Reentered 4/15/72
Molniya 1-20	1972 25A	USSR	Apr 4	Plesetsk	A-2-e	1,000	705.3	480	39,260	65.6	Decayed 1/30/74
SRET 1	1972 25B	France	Apr 4	Plesetsk	–	15	704.7	458	39,250	65.6	Decayed 2/26/74: French test payload
Kosmos 484	1972 26A	USSR	Apr 6	Plesetsk	A-2	5,900	88.8	203	236	81.3	Reentered 4/18/72
Interkosmos 6	1972 27A	USSR	Apr 7	Tyuratam	A-2	6,000	89	203	256	51.8	Recovered 4/11/72: scientific
Kosmos 485	1972 28A	USSR	Apr 11	Plesetsk	B-1	325	92.1	280	506	71	Decayed 8/30/72
Prognoz 1	1972 29A	USSR	Apr 14	Tyuratam	A-2-e	845	5,820	950	200,000	65*	In orbit: scientific
Kosmos 486	1972 30A	USSR	Apr 14	Plesetsk	A-2	6,300	89.1	214	267	81.4	Reentered 4/27/72
Apollo 16	1972 31A	NASA	Apr 16	ETR	Saturn V	46,733	–	–	–	–	Recovered 4/27/72: John Young, Charles Duke landed at Descartes. Thomas Mattingly flew longest solo flight to date in command module, performing EVA on return trip. Mission duration 11 days, 1 hr, 51 mn
ALSEP 16							16.0 e, 9.0 s (lunar surface)				Science station data until 10/1/77
P&F Subsatellite	1972 31D	NASA	Apr 24	Apollo 16	–	36	–	–	–	–	Impacted moon 5/29/72
None	1972 32A	USAF	Apr 19	WTR	Thorad-Agena	2,000	88.8	155	277	81.5	Decayed 5/12/72
Kosmos 487	1972 33A	USSR	Apr 21	Plesetsk	B-1	325	92.3	278	531	71	Decayed 9/24/72
Kosmos 488	1972 34A	USSR	May 5	Plesetsk	A-2	6,300	89.5	211	319	65.4	Reentered 5/18/72
Kosmos 489	1972 35A	USSR	May 6	Plesetsk	C-1	680	104.7	962	999	74	In orbit
Kosmos 490	1972 36A	USSR	May 17	Plesetsk	A-2	5,900	89.4	212	310	65.4	Reentered 5/29/72
Molniya 2-2	1972 37A	USSR	May 19	Plesetsk	A-2-e	1,800	705	460	39,300	65.5	Decayed 3/22/77
None	None	US	May 20	WTR	Titan IIIB-Agena	3,000					Failure

**Initial elements, current elements unknown*

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 491	1972 38A	USSR	May 25	Tyuratam	A-2	6,300	89.5	210	303	65	Reentered 6/8/72
None	1972 39A	USAF	May 25	WTR	Thorad-Agena	2,000	89.1	158	305	96.3	Decayed 6/4/72
Kosmos 492	1972 40A	USSR	Jun 9	Tyuratam	A-2	6,300	89.8	209	342	65	Reentered 6/22/72
Intelsat IV F-5	1972 41A	CSC	Jun 13	ETR	Atlas-Centaur	1,410	1,438.6	35,821	35,849	5.4	In orbit: stationed over Indian Ocean, 4th in Intelsat IV series
Kosmos 493	1972 42A	USSR	Jun 21	Tyuratam	A-2	5,700	89.5	213	308	65	Reentered 7/3/72
Kosmos 494	1972 43A	USSR	Jun 23	Plesetsk	C-1	750	100.6	780	794	74.1	In orbit
Kosmos 495	1972 44A	USSR	Jun 23	Plesetsk	A-2	6,300	89.3	206	298	65.4	Reentered 7/6/72
Kosmos 496	1972 45A	USSR	Jun 26	Tyuratam	A-2	6,570	89.6	195	342	51.6	Reentered 7/2/72
Prognoz 2	1972 46A	USSR	Jun 29	Tyuratam	A-2-e	845	5,820	550	200,000	65*	Decayed 12/15/82: scientific
Interkosmos 7	1972 47A	USSR	Jun 30	Kapustin Yar	B-1	375	92.6	260	555	48.4	Decayed 10/5/72: scientific
Kosmos 497	1972 48A	USSR	Jun 30	Plesetsk	B-1	300	95.2	271	788	70.9	Decayed 11/7/73
Meteor 12	1972 49A	USSR	Jun 30	Plesetsk	A-1	3,300	102.8	880	898	81.2	In orbit: Metsat
Kosmos 498	1972 50A	USSR	Jul 5	Plesetsk	B-1	325	92.1	282	511	71	Decayed 11/25/72
Kosmos 499	1972 51A	USSR	Jul 6	Tyuratam	A-2	6,300	89.2	209	283	51.8	Reentered 7/17/72
None	1972 52A	USAF	Jul 7	WTR	Titan IIID	13,300	88.7	174	251	96.8	Decayed 9/13/72
None	1972 52C	USAF	Jul 7	WTR	Titan IIID	60	94.6	497	504	96.1	Decayed 5/6/78
Kosmos 500	1972 53A	USSR	Jul 10	Plesetsk	C-1	875	95.2	509	554	74	Decayed 3/29/80
Kosmos 501	1972 54A	USSR	Jul 12	Kapustin Yar	B-1	250	109.2	221	2,168	48.5	Decayed 5/9/74
Kosmos 502	1972 55A	USSR	Jul 13	Plesetsk	A-2	5,900	89.2	206	284	65.4	Reentered 7/25/72
Kosmos 503	1972 56A	USSR	Jul 19	Plesetsk	A-2	6,300	89.4	208	304	65.4	Reentered 8/1/72
Kosmos 504	1972 57A	USSR	Jul 20	Plesetsk	C-1	50	113.9	1,319	1,494	74	In orbit
Kosmos 505	1972 57B	USSR	Jul 20	Plesetsk	C-1	50	114.3	1,349	1,495	74	In orbit
Kosmos 506	1972 57C	USSR	Jul 20	Plesetsk	C-1	50	114.6	1,379	1,495	74	In orbit

*Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 507	1972 57D	USSR	Jul 20	Plesetsk	C-1	50	114.9	1,410	1,494	74	In orbit
Kosmos 508	1972 57E	USSR	Jul 20	Plesetsk	C-1	50	115.3	1,441	1,494	74	In orbit
Kosmos 509	1972 57F	USSR	Jul 20	Plesetsk	C-1	50	115.6	1,472	1,496	74	In orbit
Kosmos 510	1972 57G	USSR	Jul 20	Plesetsk	C-1	50	116.0	1,493	1,508	74	In orbit
Kosmos 511	1972 57H	USSR	Jul 20	Plesetsk	C-1	50	116.4	1,493	1,544	74	In orbit
ERTS-1	1972 58A	NASA	Jul 23	WTR	Delta	816.4	103.1	899	911	98.8	In orbit: Earth Resources Technology Satellite, 1st to return repetitive synoptic images and data on earth's resources
Kosmos 512	1972 59A	USSR	Jul 28	Plesetsk	A-2	5,700	89.3	207	294	65.4	Reentered 8/9/72
Salyut		USSR	Jul 29	Tyuratam	D-1	18,000					Failed to orbit
Kosmos 513	1972 60A	USSR	Aug 2	Tyuratam	A-2	6,300	89.8	209	340	65	Reentered 8/15/72
Explorer 46	1972 61A	NASA	Aug 13	WI	Scout	136	97.6	492	811.6	37.7	Decayed 11/2/79: meteoroid technology
Kosmos 514	1972 62A	USSR	Aug 16	Plesetsk	C-1	680	104.3	954	966	83	In orbit
Kosmos 515	1972 63A	USSR	Aug 18	Plesetsk	A-2	6,300	89.3	203	300	72.9	Reentered 8/31/72
Denpa	1972 64A	Japan	Aug 19	Kagoshima	Mu 4S	75	154.6	232	6,093	31.0	Decayed 5/19/80: investigated ionospheric phenomena
OAO3 (Copernicus)	1972 65A	NASA	Aug 21	ETR	Atlas-Centaur	2,204	99.5	729	739	35	In orbit: large observatory for stellar radiation in the UV region
Kosmos 516	1972 66A	USSR	Aug 21	Tyuratam	F-1-m	4,540	104.5	906	1,039	64.8	In orbit
Kosmos 517	1972 67A	USSR	Aug 30	Tyuratam	A-2	5,700	89.4	207	305	65	Reentered 9/11/72
None	1972 68A	USAF	Sep 1	WTR	Titan IIIB-Agena	3,000	89.7	140	380	110.5	Reentered 9/30/72
Triad OI-1	1972 69A	USAF	Sep 2	WTR	Scout	94	100.3	728	818	90	In orbit. 1st experimental stationkeeping Transit navigation satellite
Kosmos 518	1972 70A	USSR	Sep 15	Plesetsk	A-2	5,900	89.6	208	330	72.9	Reentered 9/24/72
Kosmos 519	1972 71A	USSR	Sep 16	Tyuratam	A-2	6,300	89.8	210	343	71.3	Reentered 9/26/72
Kosmos 520	1972 72A	USSR	Sep 19	Plesetsk	A-2-e	1,800	715.1	5,250	34,971	67.6	In orbit

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Explorer 47	1972 73A	NASA	Sep 23	ETR	Delta	376	17,670	201,100	235,600	17.2*	In orbit: to investigate cislunar radiation, interplanetary magnetic field, and earth's magnetosphere
Kosmos 521	1972 74A	USSR	Sep 29	Plesetsk	C-1	750	104.9	989	992	65.8	In orbit
Molniya 2-3	1972 75A	USSR	Sep 30	Plesetsk	A-2-e	1,800	703	392	39,240	65.6	Decayed 1/12/78: communications satellite
None	1972 76A	USAF	Oct 2	WTR	Atlas F-Burner II	208	98.8	684	699	98.7	In orbit
None	1972 76B	USAF	Oct 2	WTR	Atlas F-Burner II	726	99.1	708	725	98.6	In orbit
Kosmos 522	1972 77A	USSR	Oct 4	Plesetsk	A-2	6,300	89.8	214	342	72.9	Reentered 10/17/72
Kosmos 523	1972 78A	USSR	Oct 5	Plesetsk	B-1	325	92	272	481	71.0	Decayed 3/7/73
None	1972 79A	USAF	Oct 10	WTR	Titan IIID	13,300	88.8	158	271	96.5	Reentered 1/8/73
None	1972 79C	USAF	Oct 10	WTR	Titan IIID	60	114.8	1,423	1,469	95.6	In orbit
Kosmos 524	1972 80A	USSR	Oct 11	Plesetsk	B-1	325	92.3	267	512	71.0	Decayed 3/25/73
Molniya 1-21	1972 81A	USSR	Oct 14	Plesetsk	A-2-e	1,750	705	480	39,300	65.3	Decayed 11/1/77
NOAA-2	1972 82A	NASA	Oct 15	WTR	Delta	344	114.9	1,447	1,453	101.6	In orbit: operational metsat
Oscar 6	1972 82B	NASA	Oct 15	WTR	Delta	16	114.9	1,447	1,453	101.7	In orbit: amateur radio
Kosmos 525	1972 83A	USSR	Oct 18	Plesetsk	A-2	5,900	89.3	208	292	65.4	Reentered 10/29/72
Kosmos 526	1972 84A	USSR	Oct 25	Plesetsk	B-1	325	92	282	511	71.0	Decayed 4/8/73
Meteor 13	1972 85A	USSR	Oct 26	Plesetsk	A-1	3,300	102.4	858	883	81.2	In orbit: metsat
Kosmos 527	1972 86A	USSR	Oct 31	Plesetsk	A-2	6,300	89.7	214	330	65.4	Reentered 11/13/72
Kosmos 528	1972 87A	USSR	Nov 1	Plesetsk	C-1	50	114.1	1,364	1,465	74.0	In orbit
Kosmos 529	1972 87B	USSR	Nov 1	Plesetsk	C-1	50	114.5	1,401	1,465	74.0	In orbit
Kosmos 530	1972 87C	USSR	Nov 1	Plesetsk	C-1	50	113.8	1,331	1,466	74.0	In orbit
Kosmos 531	1972 87D	USSR	Nov 1	Plesetsk	C-1	50	114.7	1,419	1,467	74.0	In orbit
Kosmos 532	1972 87E	USSR	Nov 1	Plesetsk	C-1	50	113.4	1,297	1,466	74.0	In orbit

*Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 533	1972 87F	USSR	Nov 1	Plesetsk	C-1	50	113.6	1,314	1,466	74.0	In orbit
Kosmos 534	1972 87G	USSR	Nov 1	Plesetsk	C-1	50	113.9	1,347	1,466	74.0	In orbit
Kosmos 535	1972 87H	USSR	Nov 1	Plesetsk	C-1	50	114.3	1,382	1,466	74.0	In orbit
Kosmos 536	1972 88A	USSR	Nov 3	Plesetsk	C-1	50	95.2	518	544	74.0	Decayed 7/20/80
None	1972 89A	USAF	Nov 9	WTR	Thor-Burner II	195	101.4	797	855	98.8	In orbit
Anik 1	1972 90A	Can	Nov 10	ETR	Delta	557	1457.5	36,150	36,257	1.2	In orbit: 1st Canadian communications satellite
Explorer 48 (SAS B)	1972 91A	NASA	Nov 15	San Marco	Scout	165	95.4	443	632	1.9	Decayed 5/1/79: small astronomy satellite
ESRO IV	1972 92A	ESRO	Nov 22	WTR	Scout	114	99	245	1,087	91.1	Decayed 4/15/74: investigation of polar ionosphere
None	None	USSR	Nov 22	Tyuratam	G-1						Final attempt to launch Saturn-class booster; failed
Kosmos 537	1972 93A	USSR	Nov 25	Tyuratam	A-2	5,900	89.6	207	324	65.0	Reentered 12/7/72
Interkosmos 8	1972 94A	USSR	Nov 30	Plesetsk	B-1	340	93.2	214	679	71.0	Decayed 3/2/73: scientific
Molniya 1-22	1972 95A	USSR	Dec 2	Tyuratam	A-2-e	1,750	703	500	39,100	65.0	Decayed 2/11/76: communications satellite
Apollo 17	1972 96A	NASA	Dec 7	ETR	Saturn V	46,743	88.7	169	178	32.5	Recovered 12/19/72: Eugene Cernan, Harrison Schmitt landed at Taurus Littrow. Ronald Evans remained aboard command module. Mission duration 12 days, 13 hrs, 51 mins
ALSEP 17							30.75 e, 20.17 n (lunar surface)				Science station data until 10/1/77
Nimbus 5	1972 97A	NASA	Dec 11	WTR	Delta	772	107.1	1,087	1,100	99.7	In orbit: advanced metsat
Molniya 2-4	1972 98A	USSR	Dec 12	Plesetsk	A-2-e	1,800	706	495	39,300	65.3	Decayed 1/22/75: communications satellite
Kosmos 538	1972 99A	USSR	Dec 14	Plesetsk	A-2	6,300	89.4	212	305	65.4	Reentered 12/27/72
Aeros	1972 100A	FRG	Dec 16	WTR	Scout	127	95.3	223	867	96.9	Decayed 8/22/73: Federal Republic of Germany scientific
None	1972 101A	USAF	Dec 20	ETR	Atlas-Agena	700	Current elements not maintained				In orbit
Kosmos 539	1972 102A	USSR	Dec 21	Plesetsk	C-1	600	112.9	1,340	1,377	74.0	In orbit
None	1972 103A	USAF	Dec 21	WTR	Titan IIIB-Agena	3,000	89.8	132	398	110.4	Reentered 1/23/73

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 540	1972 104A	USSR	Dec 25	Plesetsk	C-1	750	100.6	772	798	74.1	In orbit
Kosmos 541	1972 105A	USSR	Dec 27	Plesetsk	A-2	5,900	90.3	242	371	81.4	Reentered 1/8/73
Kosmos 542	1972 106A	USSR	Dec 28	Plesetsk	A-1	3,800	93.9	434	496	81.2	Decayed 10/9/83
Luna 21	1973 1A	USSR	Jan 8	Tyuratam	D-1-e	4,850	Lunar trajectory				Landed on moon 1/16/73: 840-kg Lunokhod unmanned rover
Kosmos 543	1973 2A	USSR	Jan 11	Tyuratam	A-2	4,000	89.6	203	311	65.0	Recovered 1/24/73: military reconnaissance
Kosmos 544	1973 3A	USSR	Jan 20	Plesetsk	C-1	750	95.1	510	541	74.0	Decayed 6/15/80: probable ferret
Kosmos 545	1973 4A	USSR	Jan 24	Plesetsk	B-1	400	92.2	269	495	71.0	Decayed 7/31/73: electronic monitor
Kosmos 546	1973 5A	USSR	Jan 26	Kapustin Yar	C-1	750	96.3	560	598	50.7	In orbit: probable scientific
Kosmos 547	1973 6A	USSR	Feb 1	Tyuratam	A-2	4,000	89.6	203	310	65.0	Recovered 2/13/73: military reconnaissance
Molniya 1-23	1973 7A	USSR	Feb 3	Tyuratam	A-2-e	1,000	717.7	904	39,451	65.0	Decayed 10/23/77
Kosmos 548	1973 8A	USSR	Feb 8	Plesetsk	A-2	4,000	89.6	205	300	65.4	Recovered 2/21/73: military reconnaissance
Prognoz 3	1973 9A	USSR	Feb 15	Tyuratam	A-2-e	845	5,783	590	200,000	65*	In orbit: solar flare monitor
Kosmos 549	1973 10A	USSR	Feb 28	Plesetsk	C-1	750	95.1	513	538	74.0	Decayed 6/29/80: probable ferret
Kosmos 550	1973 11A	USSR	Mar 1	Plesetsk	A-2	4,000	89.7	206	317	65.4	Recovered 3/11/73: military reconnaissance
Kosmos 551	1973 12A	USSR	Mar 6	Tyuratam	A-2	4,000	89.5	206	296	65.0	Recovered 3/20/73: military reconnaissance
None	1973 13A	USAF	Mar 6	ETR	Atlas-Agena D	700	Current elements not maintained				In orbit
None	1973 14A	USAF	Mar 9	WTR	Titan IIID	13,300	88.8	152	270	95.7	Decayed 5/19/73
Meteor 14	1973 15A	USSR	Mar 20	Plesetsk	A-1	2,000	102.5	866	883	81.2	In orbit: metsat
Kosmos 552	1973 16A	USSR	Mar 22	Plesetsk	A-2	4,000	89.7	204	312	72.8	Recovered 4/3/73: military reconnaissance
Salyut 2	1973 17A	USSR	Apr 3	Tyuratam	D-1	18,500	89.0	207	248	51.6	Decayed 5/28/73: space station disintegrated 4/14/73
Molniya 2-5	1973 18A	USSR	Apr 5	Plesetsk	A-2-e	1,250	717.7	617	39,735	65.6	Decayed 1/6/79: communications satellite
Pioneer 11	1973 19A	NASA	Apr 6	ETR	Atlas-Centaur	259	Trans-solar trajectory				In orbit: 2nd Jupiter probe; encounter 12/74; encounter Saturn 9/1/79; solar system escape trajectory

*Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 553	1973 20A	USSR	Apr 12	Plesetsk	B-1	400	92.2	272	494	71.0	Decayed 11/11/73: electronic monitor
Kosmos 554	1973 21A	USSR	Apr 19	Plesetsk	A-2	4,000	89.5	194	304	72.8	Decayed 5/27/73: returnable payload exploded into 197 pieces 5/7; military reconnaissance
Interkosmos 9	1973 22A	USSR	Apr 19	Kapustin Yar	B-1	400	102.1	199	1,526	48.4	Decayed 10/15/73: "Copernicus 500" solar radiation monitor
Anik 2	1973 23A	Can	Apr 20	ETR	Delta	272	1,442.9	35,864	35,974	4.2	In orbit: Canadian commsat
Kosmos 555	1973 24A	USSR	Apr 25	Plesetsk	A-2	4,000	89.0	216	233	81.3	Recovered 5/7/73: military and ice reconnaissance
Kosmos	None	USSR	Apr 25	Tyuratam	F-1-m						Failed to orbit. Rorsat
Kosmos 556	1973 25A	USSR	May 5	Plesetsk	A-2	4,000	89.0	218	225	81.3	Recovered 5/14/73: military and ice reconnaissance
Kosmos 557	1973 26A	USSR	May 11	Tyuratam	D-1	19,400	89.0	214	243	51.6	Decayed 5/22/73: Salyut failure
Skylab 1	1973 27A	NASA	May 14	ETR	Saturn V	74,783	93.2	422	442	50.0	Decayed 7/11/79: station included Orbital Workshop, Airlock Module, Multiple Docking Adapter, and Apollo Telescope Mount
None	1973 28A	USAF	May 16	WTR	Titan IIIB-Agena D	3,000	89.4	136	352	110.5	Reentered 6/13/73
Kosmos 558	1973 29A	USSR	May 17	Plesetsk	B-1	400	92.3	269	501	71.0	Decayed 12/23/73: electronic monitor
Kosmos 559	1973 30A	USSR	May 18	Plesetsk	A-2	4,000	89.8	204	325	65.4	Recovered 5/23/73: military reconnaisance
Kosmos 560	1973 31A	USSR	May 23	Plesetsk	A-2	4,000	89.7	203	314	72.9	Recovered 6/5/73: military reconnaissance
Skylab 2	1973 32A	NASA	May 25	ETR	Saturn IB	19,979	93.2	422	442	50.0	Recovered 6/22/73: carried Pete Conrad, Joe Kerwin, Paul Weitz. Mission duration 28 days, 49 mn, 49 sec
Kosmos 561	1973 33A	USSR	May 25	Plesetsk	A-2	4,000	89.5	206	295	65.4	Recovered 6/6/73: military reconnaissance
Meteor 15	1973 34A	USSR	May 29	Plesetsk	A-1	2,000	102.3	842	891	81.2	In orbit: metsat
Kosmos 562	1973 35A	USSR	Jun 5	Plesetsk	B-1	400	92.1	270	487	71.0	Decayed 1/7/74: electronic monitor
Kosmos 563	1973 36A	USSR	Jun 6	Plesetsk	A-2	4,000	89.5	206	298	65.4	Recovered 6/18/73: military reconnaissance
Kosmos 564	1973 37A	USSR	Jun 8	Plesetsk	C-1	40	114.6	1,393	1,478	74.0	In orbit: military commsat
Kosmos 565	1973 37B	USSR	Jun 8	Plesetsk	C-1	40	115.3	1,447	1,488	74.0	In orbit: military commsat
Kosmos 566	1973 37C	USSR	Jun 8	Plesetsk	C-1	40	115.0	1,432	1,480	74.0	In orbit: military commsat
Kosmos 567	1973 37D	USSR	Jun 8	Plesetsk	C-1	40	114.8	1,411	1,481	74.0	In orbit: military commsat

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 568	1973 37E	USSR	Jun 8	Plesetsk	C-1	40	114.4	1,373	1,478	74.0	In orbit: military commsat
Kosmos 569	1973 37F	USSR	Jun 8	Plesetsk	C-1	40	114.2	1,355	1,478	74.0	In orbit: military commsat
Kosmos 570	1973 37G	USSR	Jun 8	Plesetsk	C-1	40	113.9	1,335	1,479	74.0	In orbit: military commsat
Kosmos 571	1973 37H	USSR	Jun 8	Plesetsk	C-1	40	113.7	1,317	1,478	74.0	In orbit: military commsat
Kosmos 572	1973 38A	USSR	Jun 10	Tyuratam	A-2	4,000	89.3	206	281	51.7	Recovered 6/23/73: new model military reconnaissance
Explorer 49	1973 39A	NASA	Jun 10	ETR	Delta	328	Selenocentric orbit				In lunar orbit: Radio Astronomy Explorer-B measures galactic and solar radio noise
None	1973 40A	USAF	Jun 12	ETR	Titan IIIC	820	Current elements not maintained				In orbit
Kosmos 573	1973 41A	USSR	Jun 15	Tyuratam	A-2	6,570	89.5	192	309	51.6	Recovered 6/17/73: unmanned Soyuz test flight
Kosmos 574	1973 42A	USSR	Jun 20	Plesetsk	C-1	550	105.0	978	1,009	83.0	In orbit: navsat
Kosmos 575	1973 43A	USSR	Jun 21	Plesetsk	A-2	4,000	89.3	204	271	64.5	Recovered 7/3/73: military reconnaissance
None	None	USAF	Jun 28	WTR	Titan IIIB-Agena D	3,000	–	–	–	–	Failed to orbit
Kosmos 576	1973 44A	USSR	Jun 27	Plesetsk	A-2	4,000	89.9	204	332	72.9	Recovered 7/9/73: military reconnaissance
Molniya 2-6	1973 45A	USSR	Jul 11	Plesetsk	A-2-e	1,250	705.1	441	39,285	65.4	Decayed 8/5/78: domestic communications
None	1973 46A	USAF	Jul 13	WTR	Titan IIID	13,300	88.8	156	269	96.2	Reentered 10/12/73
ITOS-E	None	NASA	Jul 16	WTR	Delta	345	–	–	–	–	Failed to orbit: 2nd stage malfunction; Improved Tiros Operational System
Mars 4	1973 47A	USSR	Jul 21	Tyuratam	D-1-e	4,650	Heliocentric orbit				Failed to achieve Mars orbit
Kosmos 577	1973 48A	USSR	Jul 25	Plesetsk	A-2	4,000	89.4	171	313	65.4	Recovered 8/7/73: military reconnaissance
Mars 5	1973 49A	USSR	Jul 25	Tyuratam	D-1-e	4,650	Areocentric orbit				In orbit: Mars orbiter
Skylab 3	1973 50A	NASA	Jul 28	ETR	Saturn 1B	20,121	93.2	422	442	50.0	Recovered 9/25/73: carried Alan Bean, Owen Garriott, Jack Lousma. Mission duration 59 days, 11 hrs, 9 mn, 4 sec
Kosmos 578	1973 51A	USSR	Aug 1	Plesetsk	A-2	4,000	89.4	200	292	65.4	Recovered 8/13/73: military reconnaissance
Mars 6	1973 52A	USSR	Aug 5	Tyuratam	D-1-e	4,650	Heliocentric orbit				In orbit: Mars lander. Failed
Mars 7	1973 53A	USSR	Aug 9	Tyuratam	D-1-e	4,650	Heliocentric orbit				In orbit: Mars Flyby, lander missed

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1973 54A	USAF	Aug 17	WTR	Thor-Burner II	195	101.2	795	839	98.5	In orbit
Kosmos 579	1973 55A	USSR	Aug 21	Plesetsk	A-2	4,000	89.3	196	282	65.4	Recovered 9/3/73: military reconnaissance
None	1973 56A	USAF	Aug 21	WTR	Titan IIIB-Agena D	700	Current elements not maintained				In orbit
Kosmos 580	1973 57A	USSR	Aug 22	Plesetsk	B-1	400	92.2	273	493	71.0	Decayed 4/1/74: electronic monitor
Intelsat IV F-7	1973 58A	CSC	Aug 23	ETR	Atlas-Centaur	1,410	1,460.0	35,905	36,601	4.4	In orbit: over Atlantic, 5th in Intelsat IV series
Kosmos 581	1973 59A	USSR	Aug 24	Tyuratam	A-2	4,000	89.4	208	288	51.6	Recovered 9/6/73: military reconnaissance
Kosmos 582	1973 60A	USSR	Aug 28	Plesetsk	C-1	750	95.2	519	543	74.0	Decayed 9/5/80: probable ferret
Molniya 1-24	1973 61A	USSR	Aug 30	Plesetsk	A-2-e	1,000	717.8	463	39,893	65.5	Decayed 12/5/79: domestic communications
Kosmos 583	1973 62A	USSR	Aug 30	Tyuratam	A-2	4,000	89.5	204	298	64.9	Recovered 9/12/73: military reconnaissance
Kosmos 584	1973 63A	USSR	Sep 6	Plesetsk	A-2	4,000	90.0	205	336	72.8	Recovered 9/20/73: military reconnaissance
Kosmos 585	1973 64A	USSR	Sep 8	Plesetsk	C-1	550	113.5	1,373	1,402	74.0	In orbit: navsat
Kosmos 586	1973 65A	USSR	Sep 14	Plesetsk	C-1	550	104.7	961	1,003	82.9	In orbit: navsat
None	None	PRC	Sep 18	Shuang Cheng Tzu	CS-5						Failed to orbit
Kosmos 587	1973 66A	USSR	Sep 21	Plesetsk	A-2	4,000	89.6	205	300	65.4	Recovered 10/4/73: military reconnaissance
Soyuz 12	1973 67A	USSR	Sep 27	Tyuratam	A-2	6,570	88.5	171	229	51.6	Recovered 9/29/73: carried Vasili Lazarev, Oleg Makarov. Maiden flight of new Salyut ferry
None	1973 68A	USAF	Sep 27	WTR	Titan IIIB-Agena D	3,000	89.7	131	385	110.5	Reentered 10/28/73
Kosmos 588	1973 69A	USSR	Oct 2	Plesetsk	C-1	40	115.3	1,446	1,491	74.0	In orbit: military commsat
Kosmos 589	1973 69B	USSR	Oct 2	Plesetsk	C-1	40	114.9	1,412	1,487	74.0	In orbit: military commsat
Kosmos 590	1973 69C	USSR	Oct 2	Plesetsk	C-1	40	115.1	1,431	1,485	74.0	In orbit: military commsat
Kosmos 591	1973 69D	USSR	Oct 2	Plesetsk	C-1	40	114.1	1,344	1,485	74.0	In orbit: military commsat

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 592	1973 69E	USSR	Oct 2	Plesetsk	C-1	40	113.9	1,328	1,483	74.0	In orbit: military commsat
Kosmos 593	1973 69F	USSR	Oct 2	Plesetsk	C-1	40	114.3	1,361	1,464	74.0	In orbit: military commsat
Kosmos 594	1973 69G	USSR	Oct 2	Plesetsk	C-1	40	114.5	1,378	1,484	74.0	In orbit: military commsat
Kosmos 595	1973 69H	USSR	Oct 2	Plesetsk	C-1	40	114.7	1,396	1,484	74.0	In orbit: military commsat
Kosmos 596	1973 70A	USSR	Oct 3	Plesetsk	A-2	4,000	89.4	206	287	65.4	Recovered 10/9/73: military reconnaissance
Kosmos 597	1973 71A	USSR	Oct 6	Plesetsk	A-2	4,000	89.5	206	290	65.4	Recovered 10/12/73: military reconnaissance
Kosmos 598	1973 72A	USSR	Oct 10	Plesetsk	A-2	4,000	89.9	205	332	72.8	Recovered 10/16/73: military reconnaissance
Kosmos 599	1973 73A	USSR	Oct 15	Tyuratam	A-2	4,000	89.3	202	280	64.9	Recovered 10/28/73: military reconnaissance
Kosmos 600	1973 74A	USSR	Oct 16	Plesetsk	A-2	4,000	90.0	205	340	72.8	Recovered 10/23/73: military reconnaissance
Kosmos 601	1973 75A	USSR	Oct 16	Plesetsk	B-1	400	102.3	200	1,531	81.9	Decayed 8/15/74: electronic monitor
Molniya 2-7	1973 76A	USSR	Oct 19	Plesetsk	A-2-e	1,250	732.6	754	40,328	64.8	Decayed 7/8/83: domestic communications
Kosmos 602	1973 77A	USSR	Oct 20	Plesetsk	A-2	4,000	90.0	210	335	72.9	Recovered 10/29/73: military reconnaissance
Explorer 50	1973 78A	NASA	Oct 26	ETR	Delta	371	17,279	141,185	288,859	28.7*	In orbit: solar flare and radiation monitor
Kosmos 603	1973 79A	USSR	Oct 27	Plesetsk	A-2	4,000	90.2	205	357	72.9	Recovered 11/9/73: military reconnaissance
Kosmos 604	1973 80A	USSR	Oct 29	Plesetsk	A-1	2,000	95.6	542	555	81.2	In orbit: probable ferret
Transit	1973 81A	USN	Oct 30	WTR	Scout Altair	58	105.4	889	1,134	90.1	In orbit: navsat
Interkosmos 10	1973 82A	USSR	Oct 30	Plesetsk	C-1	550	102.1	260	1,454	74.0	Decayed 7/1/77: scientific research in cooperation with Czechoslovakia and the German Democratic Republic
Kosmos 605	1973 83A	USSR	Oct 31	Plesetsk	A-2	5,500	90.7	213	403	62.8	Recovered 11/22/73: animal flight test of manned spaceflight systems
Kosmos 606	1973 84A	USSR	Nov 2	Plesetsk	A-2-e	1,250	717.1	3,599	36,721	67.5	In orbit: probable early warning military
Mariner 10	1973 85A	NASA	Nov 3	ETR	Atlas-Centaur	526	Heliocentric orbit				Venus and Mercury encounter during 1974
NOAA 3	1973 86A	NASA	Nov 6	WTR	Delta	345	116.1	1,499	1,508	101.7	In orbit: ITOS-F metsat. Delta 2nd stage exploded 12/28, 168 pieces

*Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 607	1973 87A	USSR	Nov 10	Plesetsk	A-2	4,000	90.0	204	341	72.8	Recovered 11/22/73: military reconnaissance
None	1973 88A	USAF	Nov 10	WTR	Titan IIID	13,300	88.6	159	271	96.9	Reentered 3/13/74
None	1973 88B	USAF	Nov 10	WTR	Titan IIID	60	94.5	487	505	96.3	Decayed 11/13/73
None	1973 88C	USAF	Nov 10	WTR	Titan IIID	60	114.6	1,418	1,458	96.9	Decayed 12/26/78
Molniya 1-25	1973 89A	USSR	Nov 14	Tyuratam	A-2-e	1,000	702.2	421	39,165	64.9	Decayed 5/26/79: domestic communications
Skylab 4	1973 90A	NASA	Nov 16	ETR	Saturn 1B	20,847	93.2	422	442	50.0	Recovered 2/8/74: carried Jerry Carr, Ed Gibson, and Bill Pogue. Longest U.S. space mission 84 days, 1 hr, 15 mn, 31 sec
Kosmos 608	1973 91A	USSR	Nov 20	Plesetsk	B-1	400	92.3	270	503	71.0	Decayed 7/10/74: electronic monitor
Kosmos 609	1973 92A	USSR	Nov 21	Tyuratam	A-2	4,000	90.1	241	314	70.0	Recovered 12/4/73: military reconnaissance
Kosmos 610	1973 93A	USSR	Nov 27	Plesetsk	C-1	750	95.3	515	546	74.0	Decayed 9/15/80: probable ferret
Kosmos 611	1973 94A	USSR	Nov 28	Plesetsk	B-1	4,000	92.1	270	481	71.0	Decayed 6/19/74: electronic monitor
Kosmos 612	1973 95A	USSR	Nov 28	Plesetsk	A-2	4,000	90.0	206	346	72.8	Recovered 12/11/73: military reconnaissance
Kosmos 613	1973 96A	USSR	Nov 30	Tyuratam	A-2	6,570	89.0	188	273	51.6	Reentered 1/29/74: unmanned Soyuz test flight
Molniya 1-26	1973 97A	USSR	Nov 30	Plesetsk	A-2-e	1,000	717.8	1,370	38,985	64.1	Decayed 6/9/85: domestic communications
Kosmos 614	1973 98A	USSR	Dec 4	Plesetsk	C-1	750	100.4	760	796	74.1	In orbit: probable military test
Kosmos 615	1973 99A	USSR	Dec 13	Plesetsk	B-1	400	95.6	270	834	71.0	Decayed 12/17/75: electronic monitor
DSCS-II B3	1973 100A	USAF	Dec 14	ETR	Titan IIIC	566	1437.2	35,801	35,816	2.8	In orbit: military commsat stationed above 13 deg. w long.
DSCS-II B4	1973 100B	USAF	Dec 14	ETR	Titan IIIC	566	1,437.7	35,803	35,830	9.0	In orbit: military commsat stationed above 175 deg. e long.
Explorer 51	1973 101A	NASA	Dec 16	WTR	Delta	658	132.4	155	4,297	68.1	Decayed 12/12/78: Atmosphere Explorer-C, upper atmosphere monitor
Kosmos 616	1973 102A	USSR	Dec 17	Plesetsk	A-2	4,000	89.8	205	330	72.9	Recovered 12/28/73: military reconnaissance
Soyuz 13	1973 103A	USSR	Dec 18	Tyuratam	A-2	6,570	89.3	222	254	51.6	Recovered 12/26/73: carried Pyotr Klimuk, Valentin Lebedev. 1st time U.S. (Skylab)/USSR in space at once. They did not meet. Mission duration 7 days, 20 hrs, 55 mn
Kosmos 617	1973 104A	USSR	Dec 19	Plesetsk	C-1	40	113.9	1,332	1,482	74.0	In orbit: military commsat

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 618	1973 104B	USSR	Dec 19	Plesetsk	C-1	40	115.2	1,442	1,484	74.0	In orbit: military commsat
Kosmos 619	1973 104C	USSR	Dec 19	Plesetsk	C-1	40	115.0	1,423	1,485	74.0	In orbit: military commsat
Kosmos 620	1973 104D	USSR	Dec 19	Plesetsk	C-1	40	115.4	1,457	1,491	74.0	In orbit: military commsat
Kosmos 621	1973 104E	USSR	Dec 19	Plesetsk	C-1	40	114.7	1,405	1,482	74.0	In orbit: military commsat
Kosmos 622	1973 104F	USSR	Dec 19	Plesetsk	C-1	40	114.3	1,367	1,483	74.0	In orbit: military commsat
Kosmos 623	1973 104G	USSR	Dec 19	Plesetsk	C-1	40	114.5	1,385	1,483	74.0	In orbit: military commsat
Kosmos 624	1973 104H	USSR	Dec 19	Plesetsk	C-1	40	114.1	1,349	1,483	74.0	In orbit: military commsat
Kosmos 625	1973 105A	USSR	Dec 21	Plesetsk	A-2	4,000	89.7	194	330	72.8	Reentered 1/3/74: military reconnaissance
Molniya 2-8	1973 106A	USSR	Dec 25	Plesetsk	A-2-e	1,250	717.8	1,272	39,083	64.1	Decayed 11/24/84: domestic communications
Oreol 2	1973 107A	Fran/USSR	Dec 26	Plesetsk	C-1	550	106.0	393	1,691	74.0	In orbit: French scientific payload
Kosmos 626	1973 108A	USSR	Dec 27	Tyuratam	F-1-m	4,000	104.0	906	984	65.4	In orbit: military maneuverable nonrecoverable
Kosmos 627	1973 109A	USSR	Dec 29	Plesetsk	C-1	550	104.9	966	1,015	83.0	In orbit: navigation
Kosmos 628	1974 1A	USSR	Jan 17	Plesetsk	C-1	—	104.7	952	1,010	83.0	In orbit: navigation
Skynet 2A	1974 2A	UK	Jan 19	ETR	Thorad Delta	129	121.48	96	3,406	37.6	Decayed 1/25/74: military commsat
Kosmos 629	1974 3A	USSR	Jan 24	Plesetsk	A-2	4,000	89.3	197	289	62.8	Reentered 2/5/74: reconnaissance
Kosmos 630	1974 4A	USSR	Jan 30	Plesetsk	A-2	4,000	90	203	367	72.9	Reentered 2/13/74: reconnaissance
Kosmos 631	1974 5A	USSR	Feb 6	Plesetsk	C-1	875	95.2	516	543	74.0	Decayed 10/3/80: electronic ferret
Viking Test		US	Feb 11	ETR	Titan IIIE-Centaur	3,610	—	—	—	—	Failure: 1st use of Titan/Centaur
Kosmos 632	1974 6A	USSR	Feb 12	Tyuratam	A-2	4,000	89.4	184	333	65	Reentered 2/26/74: reconnaissance
None	1974 7A	USAF	Feb 13	WTR	Titan IIIB Agena	3,000	89.9	132	404	110.4	Reentered 3/17/74: reconnaissance
Tansei 2	1974 8A	Japan	Feb 16	Uchinoura	Mu 3C	65	121.6	284	3,233	31.2	Decayed 1/22/83
San Marco-4	1974 9A	Italy	Feb 18	San Marco	Scout	164	94.5	237	749	2.9	Decayed 5/4/76: scientific

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 633	1974 10A	USSR	Feb 27	Plesetsk	B-1	400	92.1	271	491	0.9	Decayed 10/4/74: military monitoring
Meteor 16	1974 11A	USSR	Mar 5	Plesetsk	A-1	2,200	102.0	825	885	81.2	In orbit: weather
Kosmos 634	1974 12A	USSR	Mar 5	Plesetsk	B-1	400	92.1	269	489	70.9	Decayed 10/9/74: military monitoring mission
UK-X4 (Miranda)	1974 13A	UK	Mar 9	WTR	Scout	93	100.8	690	898	97.9	In orbit: scientific
Kosmos 635	1974 14A	USSR	Mar 14	Plesetsk	A-2	4,000	89.8	212	350	72.9	Reentered 3/26/74: reconnaissance
None	1974 15A	USAF	Mar 16	WTR	Thor Burner IIA	195	101.2	767	859	99.0	In orbit: weather
Kosmos 636	1974 16A	USSR	Mar 20	Tyuratam	A-2	4,000	90.0	164	385	65.0	Reentered 4/3/74: reconnaissance
Kosmos 637	1974 17A	USSR	Mar 26	Tyuratam	D-1-e	2,000	1,427.1	35,380	35,838	7.2	In orbit: 1st Soviet synchronous orbit
Kosmos 638	1974 18A	USSR	Apr 3	Tyuratam	—	6,570	89.4	195	325	51.8	Reentered 4/13/74: unmanned Soyuz
Kosmos 639	1974 19A	USSR	Apr 4	Plesetsk	A-2	4,000	89.0	209	238	81.3	Reentered 4/15/74: reconnaissaance ice survey
None	1974 20A	USAF	Apr 10	WTR	Titan IIID	13,300	94.52	153	285	88.91	Decayed 7/28/74
None	1974 20B	USAF	Apr 10	WTR	Titan IIID	60	Elements not available				In orbit: apparent electronic ferret
None	1974 20C	USAF	Apr 10	WTR	Titan IIID	60	94.0	503	531	94.01	Decayed 2/22/80: apparent electronic ferret
Kosmos 640	1974 21A	USSR	Apr 11	Plesetsk	A-2	4,000	88.9	205	236	81.3	Reentered 4/23/74: reconnaissance ice survey
Westar-1	1974 22A	US	Apr 13	ETR	Thorad Delta	500	1,441.0	31,512	40,252	1.7	In orbit: 1st U.S. domestic communications
Molniya 1-27	1974 23A	USSR	Apr 20	Plesetsk	A-2-e	1,000	717.8	775	39,578	64.7	Decayed 11/17/85: domestic communications
Kosmos 641	1974 24A	USSR	Apr 23	Plesetsk	C-1	40	114.5	1,385	1,480	74.0	In orbit: military communications
Kosmos 642	1974 24B	USSR	Apr 23	Plesetsk	C-1	40	113.7	1,318	1,478	74.0	In orbit: military communications
Kosmos 643	1974 24C	USSR	Apr 23	Plesetsk	C-1	40	114.1	1,350	1,479	74.0	In orbit: military communications
Kosmos 644	1974 24D	USSR	Apr 23	Plesetsk	C-1	40	113.9	1,333	1,480	74.0	In orbit: military communications

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 645	1974 24E	USSR	Apr 23	Plesetsk	C-1	40	114.3	1,366	1,481	74.0	In orbit: military communications
Kosmos 646	1974 24F	USSR	Apr 23	Plesetsk	C-1	40	114.7	1,401	1,483	74.0	In orbit: military communications
Kosmos 647	1974 24G	USSR	Apr 23	Plesetsk	C-1	40	114.9	1,420	1,482	74.0	In orbit: military communications
Kosmos 648	1974 24H	USSR	Apr 23	Plesetsk	C-1	40	115.1	1,435	1,488	74.0	In orbit: military communications
Meteor 17	1974 25A	USSR	Apr 24	Plesetsk	A-1	2,200	102.4	855	887	81.2	In orbit: weather satellite
Molniya 2-9	1974 26A	USSR	Apr 26	Plesetsk	A-2-e	1,250	717.9	1,468	38,892	63.2	In orbit: domestic communications
Kosmos 649	1974 27A	USSR	Apr 29	Plesetsk	A-2	4,000	89.3	189	320	62.8	Reentered 5/11/74: reconnaissance
Kosmos 650	1974 28A	USSR	Apr 29	Plesetsk	C-1	600	113.4	1,365	1,399	74.0	In orbit: navigation or geodetic
Kosmos 651	1974 29A	USSR	May 15	Tyuratam	F-1-m	4,540	103.4	897	940	65.0	In orbit: ocean surveillance
Kosmos 652	1974 30A	USSR	May 15	Tyuratam	A-2	4,000	89.6	180	362	51.8	Reentered 5/23/74: reconnaissance
Kosmos 653	1974 31A	USSR	May 15	Plesetsk	A-2	4,000	89.3	196	309	62.8	Reentered 5/27/74: reconnaissance
Kosmos 654	1974 32A	USSR	May 17	Tyuratam	F-1-m	4,540	104.4	910	1,022	65.0	In orbit: ocean surveillance
SMS-1	1974 33A	NASA/ US	May 17	ETR	Thorad Delta	243	2,266.7	50,781	50,781	5.6	In orbit: 1st Synchronous Meteorological Satellite
Interkosmos 11	1974 34A	USSR	May 17	Kapustin Yar	C-1	400	94.5	483	591	50.6	Decayed 9/6/79: scientific
Kosmos 655	1974 35A	USSR	May 21	Plesetsk	C-1	875	95.2	521	540	74.0	Decayed 11/19/80: ferret
Kosmos 656	1974 36A	USSR	May 27	Tyuratam	A-2	6,570	90.1	195	364	51.6	Reentered 5/29/74: unmanned Soyuz
Luna 22	1974 37A	USSR	May 29	Tyuratam	D-1-e	4,000		Selenocentric orbit			In orbit: lunar probe
Kosmos 657	1974 38A	USSR	May 30	Plesetsk	A-2	4,000	89.2	182	317	62.8	Reentered 6/13/74: reconnaissance
ATS-6	1974 39A	NASA	May 30	ETR	Titan IIIC	930	1,412.1	35,191	35,438	8.0	In orbit: applications technology
Explorer 52 (Hawkeye)	1974 40A	NASA	Jun 3	WTR	Scout	27	3,077.7	2,145	125,274	89.9	Decayed 4/28/78: solar wind research
Kosmos 658	1974 41A	USSR	Jun 6	Tyuratam	A-2	4,000	89.4	204	286	64.9	Reentered 6/18/74: reconnaissance
None	1974 42A	USAF	Jun 6	WTR	Titan IIIB Agena	3,000	89.9	123	412	110.5	Reentered 7/23/74: reconnaissance

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 659	1974 43A	USSR	Jun 13	Plesetsk	A-2	4,000	89.7	190	360	62.8	Reentered 6/26/74: reconnaissance
Kosmos 660	1974 44A	USSR	Jun 18	Plesetsk	C-1	650	107.2	388	1,805	83.0	In orbit: military monitoring
Kosmos 661	1974 45A	USSR	Jun 21	Plesetsk	C-1	875	95.1	512	542	74.0	Decayed 8/27/80: ferret
Salyut 3	1974 46A	USSR	Jun 24	Tyuratam	D-1	18,500	89.4	232	257	51.5	Reentered 1/24/75: space station. Capsule ejected 9/27/74
Kosmos 662	1974 47A	USSR	Jun 26	Plesetsk	B-1	400	94.4	267	717	70.8	Decayed 8/28/76: military monitoring
Kosmos 663	1974 48A	USSR	Jun 27	Plesetsk	C-1	680	104.7	964	999	83.0	In orbit: navigation
Kosmos 664	1974 49A	USSR	Jun 29	Plesetsk	A-2	4,000	89.9	205	341	72.8	Reentered 7/11/74: reconnaissance
Kosmos 665	1974 50A	USSR	Jun 29	Plesetsk	A-2-e	1,250	717.9	1,484	38,874	66.4	In orbit: early warning
Soyuz 14	1974 51A	USSR	Jul 3	Tyuratam	A-2	6,570	89.9	265	270	51.6	Reentered 7/19/74: transported Pavel Popovich, Yuri Artyukhin to Salyut 3. Mission duration 15 days, 17 hrs, 30 mn
Meteor 18	1974 52A	USSR	Jul 9	Plesetsk	A-1	2,200	103.0	887	911	81.2	In orbit: weather
Kosmos 666	1974 53A	USSR	Jul 12	Plesetsk	A-2	4,000	89.6	191	351	62.8	Reentered 7/25/74: reconnaissance
None	None	PRC	Jul 13		FB-1						Failed to orbit
Timation 3	1974 54A	USN	Jul 14	WTR	Atlas F	293	468.7	13,464	13,756	124.7	In orbit: navigation technology
Aeros 2	1974 55A	FRG	Jul 16	WTR	Scout	127	95.6	224	869	97.4	Decayed 9/25/75: upper atmosphere research
Molniya 2-10	1974 56A	USSR	Jul 23	Plesetsk	A-2-e	1,250	717.6	1,530	39,815	63.6	In orbit: domestic communications
Kosmos 667	1974 57A	USSR	Jul 25	Tyuratam	A-2	4,000	89.5	182	342	65.0	Reentered 8/7/74: reconnaissance
Kosmos 668	1974 58A	USSR	Jul 25	Plesetsk	B-1	400	90.4	242	350	70.9	Decayed 2/21/75: military monitoring
Kosmos 669	1974 59A	USSR	Jul 26	Plesetsk	A-2	4,000	88.9	210	244	81.3	Reentered 8/8/74: reconnaissance
Molniya 1-S	1974 60A	USSR	Jul 29	Tyuratam	D-1-e	1,750	1,665.8	33,930	44,412	4.8	In orbit: domestic communications
Kosmos 670	1974 61A	USSR	Aug 6	Tyuratam	A-2	6,700	89.5	217	307	50.6	Reentered 8/9/74: possible unmanned Soyuz
Kosmos 671	1974 62A	USSR	Aug 7	Plesetsk	A-2	4,000	89.7	191	369	62.8	Reentered 8/20/74: reconnaissance
None	1974 63A	USAF	Aug 9	WTR	Thor-Burner IIA	195	101.5	792	862	98.7	In orbit: weather
Kosmos 672	1974 64A	USSR	Aug 12	Tyuratam	A-2	6,570	88.5	195	221	51.7	Reentered 8/18/74: ASTP precursor

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1974 65A	USAF	Aug 14	WTR	Titan IIIB Agena	3,000	89.89	135	402	110.5	Reentered 9/29/74: reconnaissance
Kosmos 673	1974 66A	USSR	Aug 16	Plesetsk	A-1	3,800	95.4	530	544	81.2	In orbit: ferret
Soyuz 15	1974 67A	USSR	Aug 26	Tyuratam	A-2	6,570	88.5	173	236	51.6	Returned 8/28/74: carried Lev Demin, Gennadi Sarafanov to Salyut 3. New style ferry did not rendezvous in time, crew returned after 2 days, 12 mn
Kosmos 674	1974 68A	USSR	Aug 29	Tyuratam	A-2	4,000	89.5	182	343	65	Reentered 9/7/74: reconnaissance
Kosmos 675	1974 69A	USSR	Aug 29	Plesetsk	C-1	600	113.6	1,362	1,421	74.1	In orbit: navigation or geodetic
ANS	1974 70A	Neth	Aug 30	WTR	Scout	129	99.1	258	1,173	98.0	Decayed 6/14/77: Astronomical Netherlands Satellite achieved lower altitude than intended, but obtained useful data
Kosmos 676	1974 71A	USSR	Sep 11	Plesetsk	C-1	750	100.8	786	807	74.0	In orbit: navigation or ferret or military communications
Kosmos 677	1974 72A	USSR	Sep 19	Plesetsk	C-1	40	114.4	1,396	1,464	74.0	In orbit: military communications
Kosmos 678	1974 72B	USSR	Sep 19	Plesetsk	C-1	40	115.9	1,464	1,531	74.0	In orbit: military communications
Kosmos 679	1974 72C	USSR	Sep 19	Plesetsk	C-1	40	115.7	1,464	1,509	74.0	In orbit: military communications
Kosmos 680	1974 72D	USSR	Sep 19	Plesetsk	C-1	40	115.5	1,464	1,490	74.0	In orbit: military communications
Kosmos 681	1974 72E	USSR	Sep 19	Plesetsk	C-1	40	115.3	1,463	1,471	74.0	In orbit: military communications
Kosmos 682	1974 72F	USSR	Sep 19	Plesetsk	C-1	40	115.1	1,451	1,464	74.0	In orbit: military communications
Kosmos 683	1974 72G	USSR	Sep 19	Plesetsk	C-1	40	114.9	1,433	1,464	74.0	In orbit: military communications
Kosmos 684	1974 72H	USSR	Sep 19	Plesetsk	C-1	40	114.7	1,414	1,464	74.0	In orbit: military communications
Kosmos 685	1974 73A	USSR	Sep 20	Tyuratam	A-2	4,000	89.4	208	303	65.0	Reentered 10/2/74: reconnaissance
Kosmos 686	1974 74A	USSR	Sep 26	Plesetsk	B-1	400	91.2	256	418	70.9	Decayed 5/1/75: military monitoring
Westar 2	1974 75A	US	Oct 10	ETR	Thorad Delta	500	1,442.3	35,898	35,916	3.3	In orbit: 2nd U.S. domestic communications
Kosmos 687	1974 76A	USSR	Oct 11	Plesetsk	C-1	400	94.2	286	698	74.0	Decayed 2/5/78: military monitoring
Ariel 5	1974 77A	UK	Oct 15	San Marco	Scout	129	95.3	513	557	2.9	Decayed 3/14/80: X-ray observatory
Kosmos 688	1974 78A	USSR	Oct 18	Plesetsk	A-2	4,000	89.8	179	349	62.8	Reentered 10/30/74: reconnaissance

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 689	1974 79A	USSR	Oct 18	Plesetsk	C-1	680	105.0	970	1,015	82.9	In orbit: navigation
Kosmos 690	1974 80A	USSR	Oct 22	Plesetsk	A-2	5,500	90.4	223	389	62.8	Reentered 11/12/74: bio. research
Molniya 1-28	1974 81A	USSR	Oct 24	Plesetsk	A-2-e	1,000	717.7	1,850	35,800	64.7	Decayed 12/29/85. domestic communications
Kosmos 691	1974 82A	USSR	Oct 25	Tyuratam	A-2	4,000	89.5	180	352	65	Reentered 11/6/74: reconnaissance
Meteor 19	1974 83A	USSR	Oct 28	Plesetsk	A-1	2,200	102.3	834	899	81.2	In orbit: weather
Luna 23	1974 84A	USSR	Oct 28	Tyuratam	D-1-e	5,600		Trans-lunar trajectory			Crashed on moon 11/6/74: lunar probe failure
None	1974 85A	USAF	Oct 29	WTR	Titan IIID	13,300	88.86	162	271	96.69	Reentered 3/19/75
Interkosmos 12	1974 86A	USSR	Oct 31	Plesetsk	C-1	400	94.1	243	707	74.0	Decayed 7/11/75: atmosphere/ionosphere research
Kosmos 692	1974 87A	USSR	Nov 1	Plesetsk	A-2	4,000	89.4	201	315	62.8	Reentered 11/13/74: reconnaissance
Kosmos 693	1974 88A	USSR	Nov 4	Plesetsk	A-2	4,000	89.1	215	271	81.3	Reentered 11/16/74: reconnaissance
None		PRC	Nov 5		CZ-2						Failed to orbit
NOAA-4	1974 89A	NOAA/ US	Nov 15	WTR	Thorad Delta	340	114.9	1,443	1,457	101.4	In orbit: weather. Delta 2nd stage exploded 8/20/75, 131 pieces in orbit
Amsat-Oscar 7	1974 89B	US	Nov 15	WTR	Thorad Delta	29	114.8	1,438	1,457	101.4	In orbit: for ham operators (piggy back to NOAA)
Intasat	1974 89C	Spain	Nov 15	WTR	Thorad Delta	20	114.9	1,440	1,457	101.4	In orbit: Spain's 1st satellite (piggy back to NOAA)
Kosmos 694	1974 90A	USSR	Nov 16	Plesetsk	A-2	4,000	89.8	213	344	72.9	Reentered 11/29/74: reconnaissance
Kosmos 695	1974 91A	USSR	Nov 20	Plešetsk	B-1	400	91.6	269	445	70.9	Decayed 7/15/75: military monitoring
Molniya 3-1	1974 92A	USSR	Nov 21	Plesetsk	A-2-e	1,500	717.8	1,862	38,493	64.8	Decayed 5/15/86. domestic communications
Intelsat IV F-8	1974 93A	CSC	Nov 21	ETR	Atlas-Centaur	1,410	1,443.2	35,906	35,943	3.6	In orbit: commsat
Skynet 2B	1974 94A	UK	Nov 23	ETR	Thorad Delta	129	1,436.3	35,771	35,807	7.7	In orbit: military commsat
Kosmos 696	1974 95A	USSR	Nov 27	Plesetsk	A-2	4,000	89.7	203	320	72.9	Reentered 12/9/74: reconnaissance

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Soyuz 16	1974 96A	USSR	Dec 2	Tyuratam	A-2	6,680	89.3	194	280	51.8	Returned 12/8/74: Anatoli Filipchenko, Nikolai Rukavishnikov aboard. Test of Salyut/Apollo docking mechanism. Mission duration 5 days, 22 hrs, 24 mn
Helios	1974 97A	Ger	Dec 10	ETR	Titan IIIE-Centaur	370	Heliocentric Orbit				In orbit: solar probe
Kosmos 697	1974 98A	USSR	Dec 13	Plesetsk	A-2	4,000	90.2	174	394	62.8	Reentered 12/25/74: reconnaissance
Meteor 20	1974 99A	USSR	Dec 17	Plesetsk	A-1	2,200	102.2	841	882	81.2	In orbit: weather
Kosmos 698	1974 100A	USSR	Dec 18	Plesetsk	C-1	875	95.2	514	552	74.0	Decayed 12/9/80: ferret
Symphonie 1	1974 101A	France/ Ger	Dec 19	ETR	Thorad Delta	221	1,435.0	34,871	36,658	3.6	In orbit: experimental commsat
Molniya 2-11	1974 102A	USSR	Dec 21	Plesetsk	A-2-e	1,250	718.0	1,635	39,728	62.1	In orbit: commsat
Kosmos 699	1974 103A	USSR	Dec 24	Tyuratam	F-1-m	–	93.3	429	443	65.0	Decayed 10/16/77: ocean surveillance. Exploded, 51 pieces
Salyut 4	1974 104A	USSR	Dec 26	Tyuratam	D-1	18,500	91.4	337	350	51.6	Reentered 2/2/77: space station
Kosmos 700	1974 105A	USSR	Dec 26	Plesetsk	C-1	810	104.6	958	996	83.0	In orbit: navigation
Kosmos 701	1974 106A	USSR	Dec 27	Tyuratam	A-2	4,000	89.3	170	307	71.4	Reentered 1/9/75: reconnaissance
Soyuz 17	1975 1A	USSR	Jan 10	Tyuratam	A-2	6,570	88.8	185	249	51.6	Reentered 2/9/75: Alexei Gubarev, Georgi Grechko docked with Salyut 4. Record 29 day, 13 hr, 20 mn mission
Kosmos 702	1975 2A	USSR	Jan 17	Tyuratam	A-2	4,000	89.7	205	313	71.3	Reentered 1/29/75: reconnaissance
Kosmos 703	1975 3A	USSR	Jan 21	Plesetsk	B-1	400	102.1	197	1,518	81.9	Decayed 11/20/75: military monitoring
Landsat 2	1975 4A	US	Jan 22	WTR	Delta	953	103.1	901	914	98.9	In orbit: earth resources. Booster exploded 6/19, 200 pieces
Kosmos 704	1975 5A	USSR	Jan 23	Plesetsk	A-2	4,000	89.6	205	305	72.9	Reentered 2/6/75: reconnaissance
Kosmos 705	1975 6A	USSR	Jan 28	Plesetsk	B-1	400	92.3	271	502	71.0	Decayed 11/18/75: military monitoring
Kosmos 706	1975 7A	USSR	Jan 30	Plesetsk	A-2-e	400	717.2	5,728	34,597	68.1	In orbit: military early warning
Kosmos 707	1975 8A	USSR	Feb 5	Plesetsk	C-1	900	95.0	498	547	74.0	Decayed 9/7/80: military elint
Molniya 2-12	1975 9A	USSR	Feb 6	Plesetsk	A-2-e	1,250	717.7	1,723	38,627	64.8	Decayed 7/5/85. domestic communications

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Starlette	1975 10A	France	Feb 6	Kourou	Diamant B-P4	47	104.2	805	1,108	49.8	In orbit: geodetic
SMS 2	1975 11A	US	Feb 6	ETR	Delta	627	1,436.7	35,752	35,844	1.8	In orbit: Synchronous Meteorological Satellite
Kosmos 708	1975 12A	USSR	Feb 12	Plesetsk	C-1	650	~~113~~.5	1,369	1,406	69.2	In orbit: navigation/geodetic
Kosmos 709	1975 13A	USSR	Feb 12	Plesetsk	A-2	4,000	89.4	181	310	62.8	Reentered 2/25/75: reconnaissance
Intelsat IV F-6	None	CSC	Feb 20	ETR	Atlas Centaur	1,410	–	–	–	–	Destroyed: launch vehicle malfunction
SRATS (Taiyo)	1975 14A	Japan	Feb 24	Uchinoura	Mu 3C	86	118.6	248	2,984	31.5	Decayed 6/29/80: solar radiation and thermopheric structure
Kosmos 710	1975 15A	USSR	Feb 26	Tyuratam	A-2	4,000	89.6	176	335	65.0	Reentered 3/12/75: reconnaissance
Kosmos 711	1975 16A	USSR	Feb 28	Plesetsk	C-1	40	115.4	1,460	1,490	74.0	In orbit: military commsat
Kosmos 712	1975 16B	USSR	Feb 28	Plesetsk	C-1	40	114.9	1,409	1,488	74.0	In orbit: military commsat
Kosmos 713	1975 16C	USSR	Feb 28	Plesetsk	C-1	40	114.7	1,393	1,485	74.0	In orbit: military commsat
Kosmos 714	1975 16D	USSR	Feb 28	Plesetsk	C-1	40	115.2	1,443	1,488	74.0	In orbit: military commsat
Kosmos 715	1975 16E	USSR	Feb 28	Plesetsk	C-1	40	115.7	1,468	1,502	74.0	In orbit: military commsat
Kosmos 716	1975 16F	USSR	Feb 28	Plesetsk	C-1	40	115.9	1,478	1,511	74.0	In orbit: military commsat
Kosmos 717	1975 16G	USSR	Feb 28	Plesetsk	C-1	40	116.1	1,478	1,534	74.0	In orbit: military commsat
Kosmos 718	1975 16H	USSR	Feb 28	Plesetsk	C-1	40	115.0	1,427	1,487	74.0	In orbit: military commsat
None	1975 17A	US	Mar 10	WTR	Titan IIIB	700	Current elements not maintained				In orbit
Kosmos 719	1975 18A	USSR	Mar 12	Tyuratam	A-2	4,000	89.3	175	307	65.0	Reentered 3/25/75: reconnaissance
Kosmos 720	1975 19A	USSR	Mar 21	Plesetsk	A-2	4,000	89.3	212	273	62.8	Reentered 4/1/75: reconnaissance
Kosmos 721	1975 20A	USSR	Mar 26	Plesetsk	A-2	4,000	88.9	208	228	81.3	Reentered 4/7/75: reconnaissance—ice survey
Kosmos 722	1975 21A	USSR	Mar 27	Tyuratam	A-2	4,000	90.0	204	337	71.4	Reentered 4/9/75: reconnaissance
Interkosmos 13	1975 22A	USSR	Mar 27	Plesetsk	C-1	400	104.3	285	1,643	82.9	Decayed 9/2/80: upper atmosphere scientific
Meteor 21	1975 23A	USSR	Apr 1	Plesetsk	A-1	2,200	102.4	858	887	81.2	In orbit: weather
Kosmos 723	1975 24A	USSR	Apr 2	Tyuratam	F-1-m	4,500	103.7	896	966	64.7	In orbit: ocean surveillance

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Soyuz 18A	None	USSR	Apr 5	Tyuratam	A-2	6,700					Third stage bad separation sent vehicle out of control. Capsule w/ Vasili Lazarev, Oleg Makarov ejected; crew landed safely. Intended Salyut 4 visit
Kosmos 724	1975 25A	USSR	Apr 7	Tyuratam	F-1-m	4,500	103.0	850	949	65.6	In orbit: ocean surveillance
Kosmos 725	1975 26A	USSR	Apr 8	Plesetsk	B-1	400	92.0	270	481	70.9	Decayed 1/6/76: military monitoring
GEOS 3	1975 27A	US	Apr 10	WTR	Delta	341	101.7	825	849	115.0	In orbit: Geodynamics Experimental Ocean Satellite
Kosmos 726	1975 28A	USSR	Apr 11	Plesetsk	C-1	810	104.5	954	990	83.0	In orbit: navigation
None	None	US	Apr 12	WTR	Atlas F	–	–	–	–	–	Launch failure
Molniya 3-2	1975 29A	USSR	Apr 14	Plesetsk	A-2-e	1,500	717.9	793	38,566	62.1	In orbit: domestic communications
Kosmos 727	1975 30A	USSR	Apr 16	Tyuratam	A-2	4,000	89.6	172	334	65.0	Reentered 4/28/75: reconnaissance
Kosmos 728	1975 31A	USSR	Apr 18	Plesetsk	A-2	4,000	89.8	205	323	72.8	Reentered 4/29/75: reconnaissance
None	1975 32A	US	Apr 18	WTR	Titan IIIB-Agena	3,000	89.8	132	399	110.5	Reentered 6/5/75
Ariabata	1975 33A	India	Apr 19	Kapustin Yar	C-1	360	95.1	512	537	50.7	In orbit: atmospheric research
Kosmos 729	1975 34A	USSR	Apr 22	Plesetsk	C-1	725	104.9	972	1,006	83.0	In orbit: navigation
Kosmos 730	1975 35A	USSR	Apr 24	Plesetsk	A-2	4,000	90.0	210	234	88.9	Reentered 5/6/75: reconnaissance–ice survey
Molniya 1-29	1975 36A	USSR	Apr 29	Plesetsk	A-2-e	1,000	717.8	2,200	38,156	63.8	In orbit: domestic communications
Explorer 53	1975 37A	US	May 7	San Marco	Scout	195	94.8	506	513	3.0	Decayed 4/9/79: small astronomy
Anik 3	1975 38A	Canada	May 7	ETR	Delta	286	1,439.2	35,544	36,149	2.8	In orbit: Canadian communications
Pollux	1975 39A	France	May 17	Kourou	Diamant B-P4	35	100.2	269	1,283	29.9	Decayed 8/5/75: technology
Castor	1975 39B	France	May 17	Kourou	Diamant B-P4	77	99.6	271	1,205	29.9	Decayed 2/18/79: scientific
DSCS II-B5	1975 40A	US	May 20	ETR	Titan IIIC	566	88.3	150	249	28.6	Failed to achieve useable orbit due to transtage malfunction. Decayed 5/26/75
DSCS II-B6	1975 40B	US	May 20	ETR	Titan IIIC	566	88.0	143	222	28.8	Decayed 5/26/75: military communications

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 731	1975 41A	USSR	May 21	Tyuratam	A-2	4,000	89.5	203	296	65.0	Reentered 6/2/75: reconnaissance
Intelsat IV F-1	1975 42A	CSC	May 22	ETR	Atlas Centaur	727	1,436.9	35,784	35,787	2.3	In orbit: commsat
DMSP	1975 43A	US	May 24	WTR	Thor Burner II	194	101.7	797	881	98.7	In orbit: Defense Meteorological Satellite Program
Soyuz 18	1975 44A	USSR	May 24	Tyuratam	A-2	6,570	88.6	186	230	51.6	Reentered 7/26/75: New duration record set by Pyotr Klimuk, Vitali Sevastyanov aboard Salyut 4. 62 days, 23 hrs, 20 mn
Kosmos 732	1975 45A	USSR	May 28	Plesetsk	C-1	40	114.6	1,402	1,468	74.0	In orbit: military commsat
Kosmos 733	1975 45B	USSR	May 28	Plesetsk	C-1	40	116.2	1,468	1,552	74.0	In orbit: military commsat
Kosmos 734	1975 45C	USSR	May 28	Plesetsk	C-1	40	115.0	1,441	1,469	74.0	In orbit: military commsat
Kosmos 735	1975 45D	USSR	May 28	Plesetsk	C-1	40	115.2	1,460	1,471	74.0	In orbit: military commsat
Kosmos 736	1975 45E	USSR	May 28	Plesetsk	C-1	40	115.5	1,467	1,485	74.0	In orbit: military commsat
Kosmos 737	1975 45F	USSR	May 28	Plesetsk	C-1	40	115.9	1,468	1,527	74.0	In orbit: military commsat
Kosmos 738	1975 45G	USSR	May 28	Plesetsk	C-1	40	115.7	1,466	1,508	74.0	In orbit: military commsat
Kosmos 739	1975 45H	USSR	May 28	Plesetsk	C-1	40	114.8	1,422	1,469	74.0	In orbit: military commsat
Kosmos 740	1975 46A	USSR	May 28	Tyuratam	A-2	4,000	89.5	173	326	62.5	Reentered 6/10/75: reconnaissance
Kosmos 741	1975 47A	USSR	May 30	Plesetsk	A-2	4,000	88.9	210	231	81.3	Reentered 6/11/75: reconnaissance
Kosmos 742	1975 48A	USSR	Jun 3	Plesetsk	A-2	4,000	89.8	178	355	62.9	Reentered 6/15/74: reconnaissance
Interkosmos	None	USSR	Jun 3	Plesetsk	C-1						Failed to orbit
Molniya 1-30	1975 49A	USSR	Jun 5	Plesetsk	A-2-e	1,000	717.8	1,418	38,935	64.1	Decayed 8/12/87. Domestic communications
SRET-2	1975 49B	France	Jun 5	Plesetsk	A-2-e	15.4	737	513	40,825	62.8	In orbit: research
Venera 9	1975 50A	USSR	Jun 8	Tyuratam	D-1-e	5,000	Circum-Venutian orbit				In orbit: Venus exploration, Venus lander, arrived 10/22
None	1975 51A	US	Jun 8	WTR	Titan IIID	13,300	88.8	154	269	96.4	Reentered 11/5/75
SSU 1	1975 51C	US	Jun 8	WTR	Titan IIID	–	113.5	1,385	1,393	95.1	In orbit
Nimbus 6	1975 52A	US	Jun 12	WTR	Delta	829	107.4	1,099	1,112	99.6	In orbit: weather technology
Kosmos 743	1975 53A	USSR	Jun 12	Plesetsk	A-2	4,000	89.5	179	319	62.8	Reentered 6/25/75: reconnaissance

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Venera 10	1975 54A	USSR	Jun 14	Tyuratam	D-1-e	5,000	Circum-Venutian orbit				In orbit: Venus exploration, Venus lander, arrived 10/25
None	1975 55A	US	Jun 18	ETR	Atlas Agena	350	Current elements not maintained				In orbit
Kosmos 744	1975 56A	USSR	Jun 20	Plesetsk	A-1	2,500	96.1	556	585	81.3	In orbit: military elint
OSO 8	1975 57A	US	Jun 21	ETR	Delta	1,066	94.0	467	475	32.9	Decayed 7/9/86. Orbiting Solar Observatory
Kosmos 745	1975 58A	USSR	Jun 24	Plesetsk	B-1	400	92.4	264	514	71	Decayed 3/12/76: military monitoring
Kosmos 746	1975 59A	USSR	Jun 25	Plesetsk	A-2	4,000	89.5	180	325	62.8	Reentered 7/8/75: reconnaissance
Kosmos 747	1975 60A	USSR	Jun 27	Plesetsk	A-2	4,000	89.3	193	291	62.8	Reentered 7/9/75: reconnaissance
Kosmos 748	1975 61A	USSR	Jul 3	Plesetsk	A-2	4,000	89.4	178	317	62.8	Reentered 7/16/75: reconnaissance
Kosmos 749	1975 62A	USSR	Jul 4	Plesetsk	C-1	900	95.1	505	553	74.0	Decayed 9/26/80: military elint
Molniya 2-13	1975 63A	USSR	Jul 8	Plesetsk	A-2-e	1,250	718.6	1,247	39,147	64.2	In orbit: domestic communications
Meteor 2-1	1975 64A	USSR	Jul 11	Plesetsk	A-1	2,800	102.3	847	885	81.3	In orbit: experimental weather
Soyuz 19	1975 65A	USSR	Jul 15	Tyuratam	A-2	6,182	88.5	186	220	51.8	Reentered 7-21-75: joint US/Soviet mission (Apollo/Soyuz Test Project). Alexei Leonov, Valeri Kubasov docked on 36th orbit. Mission duration 5 days, 22 hrs, 3 mn
Apollo 18	1975 66A	US	Jul 15	ETR	Saturn 1B	14,768	88.4	170	228	51.8	Splashed down 7/24/75: joint US/Soviet mission (Apollo/Soyuz Test Project). Thomas Stafford, Vance Brand, Deke Slayton met with Soyuz 19. Remained in orbit 9 days, 1 hr, 28 mn
Kosmos 750	1975 67A	USSR	Jul 17	Plesetsk	B-1	400	94.6	267	737	71.0	Decayed 9/29/77: military monitoring
Kosmos 751	1975 68A	USSR	Jul 23	Plesetsk	A-2	4,000	89.6	197	313	62.8	Reentered 8/4/75: reconnaissance
Kosmos 752	1975 69A	USSR	Jul 24	Plesetsk	C-1	900	90.9	308	324	65.8	Decayed 2/28/81: military monitoring
China 3	1975 70A	PRC	Jul 26	Shuang Cheng Tzu	CZ-2	2,500	91.0	184	461	69.0	Decayed 9-14-75
Kosmos 753	1975 71A	USSR	Jul 31	Plesetsk	A-2	4,000	89.6	181	330	62.8	Reentered 8/13/75: reconnaissance
Cos-B	1975 72A	ESA*	Aug 9	WTR	Delta	280	22,261	342	99,873	90.1**	In orbit: scientific

*European Space Agency
**Initial elements

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 754	1975 73A	USSR	Aug 13	Tyuratam	A-2	4,000	89.8	204	326	71.4	Reentered 8/26/75: reconnaissance
Kosmos 755	1975 74A	USSR	Aug 14	Plesetsk	C-1	810	104.9	967	1,007	82.9	In orbit: navigation
Viking 1	1975 75A	US	Aug 20	ETR	Titan IIIE-Centaur	3,399		Areocentric Orbit			Mars orbiter/lander. In orbit 6/19/76; died 8/7/80. Landed 7/20/76; died 11/82
Kosmos 756	1975 76A	USSR	Aug 22	Plesetsk	A-1	2,500	95.9	558	564	81.2	In orbit: elint
Symphonie-B	1975 77A	FR/ FRG	Aug 27	ETR	Delta	398	1,440.5	35,870	35,873	5.4	In orbit: French-German commsat
Kosmos 757	1975 78A	USSR	Aug 27	Plesetsk	A-2	4,000	89.5	102	316	62.8	Reentered 9/9/75: reconnaissance
Molniya 1-31	1975 79A	USSR	Sep 2	Plesetsk	A-2-e	1,000	717.9	1,684	38,673	64.9	Decayed 11/19/86. Domestic communications
Kosmos 758	1975 80A	USSR	Sep 5	Plesetsk	A-2	4,000	89.5	174	326	67.1	Exploded 9/6/75, 72 pieces, reconnaissance
Molniya 2-14	1975 81A	USSR	Sep 9	Plesetsk	A-2-e	1,250	717.8	2,006	38,347	63.8	In orbit: Domestic Communications
Kiku (ETS 1)	1975 82A	Japan	Sep 9	Tanega-shima	N-1	85	106.0	976	1,104	47.0	In orbit: applications technology
Viking 2	1975 83A	US	Sep 9	ETR	Titan IIIE-Centaur	3,399		Areocentric orbit			Mars orbiter/lander. In orbit 8/7/76; died 7/24/80. Landed 8/7/76; died 4/12/80
Kosmos 759	1975 84A	USSR	Sep 12	Plesetsk	A-2	4,000	89.6	231	276	62.8	Reentered 9/23/75: reconnaissance
Kosmos 760	1975 85A	USSR	Sep 16	Tyuratam	A-2	4,000	89.6	174	335	65.0	Reentered 9/30/75: reconnaissance
Kosmos 761	1975 86A	USSR	Sep 17	Plesetsk	C-1	40	114.8	1,397	1,481	74.0	In orbit: military commsat
Kosmos 762	1975 86B	USSR	Sep 17	Plesetsk	C-1	40	115.1	1,435	1,483	74.0	In orbit: military commsat
Kosmos 763	1975 86C	USSR	Sep 17	Plesetsk	C-1	40	115.8	1,473	1,507	74.0	In orbit: military commsat
Kosmos 764	1975 86D	USSR	Sep 17	Plesetsk	C-1	40	116.0	1,477	1,524	74.0	In orbit: military commsat
Kosmos 765	1975 86E	USSR	Sep 17	Plesetsk	C-1	40	116.3	1,476	1,548	74.0	In orbit: military commsat
Kosmos 766	1975 86F	USSR	Sep 17	Plesetsk	C-1	40	114.9	1,425	1,483	74.0	In orbit: military commsat
Kosmos 767	1975 86G	USSR	Sep 17	Plesetsk	C-1	40	115.3	1,453	1,485	74.0	In orbit: military commsat
Kosmos 768	1975 86H	USSR	Sep 17	Plesetsk	C-1	40	115.5	1,470	1,489	74.0	In orbit: military commsat
Meteor 22	1975 87A	USSR	Sep 18	Plesetsk	A-1	2,200	102.2	801	920	81.3	In orbit: weather

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Name	Int'l Desig.	Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 769	1975 88A	USSR	Sep 23	Plesetsk	A-2	4,000	89.6	203	307	72.3	Reentered 10/5/75: reconnaissance
Kosmos 770	1975 89A	USSR	Sep 24	Plesetsk	C-1	650	109.1	1,163	1,205	83.0	In orbit: navigation/ geodetic
Kosmos 771	1975 90A	USSR	Sep 25	Plesetsk	A-2	4,000	88.7	203	219	81.3	Reentered 10/8/75: reconnaissance—ice survey
Intelsat IVA F-1	1975 91A	CSC	Sep 26	ETR	Atlas Centaur	1,500	1,441.0	35,860	35,902	2.6	In orbit: communications
D2-B	1975 92A	France	Sep 27	Kourou	Diamant B-P4	115	93.7	411	499	37.2	Decayed 9/30/82: solar U V emissions study
Kosmos 772	1975 93A	USSR	Sep 29	Tyuratam	A-2	6,570	89.4	195	299	51.8	Reentered 10/2/75: Soyuz test flight
Kosmos 773	1975 94A	USSR	Sep 30	Plesetsk	C-1	750	100.7	780	798	74.1	In orbit: military communications
Kosmos 774	1975 95A	USSR	Oct 1	Tyuratam	A-2	4,000	89.7	204	315	71.4	Reentered 10/15/75: reconnaissance
Explorer 54	1975 96A	US	Oct 6	WTR	Delta	676	118.5	141	3,093	90.0	Decayed 3/12/76: atmospheric
Kosmos 775	1975 97A	USSR	Oct 8	Tyuratam	D-1-e	5,000	1,437.3	35,521	36,100	7.2	In orbit: possible early warning
None	1975 98A	US	Oct 9	WTR	Titan IIIB Agena	3,000	89.3	123	354	96.4	Reentered 11/30/75
Tip 2	1975 99A	US	Oct 12	WTR	Scout	94	96.8	527	683	90.4	In orbit: communication/navigation
GOES 1	1975 100A	US	Oct 16	ETR	Delta	295	1,436.8	35,795	35,804	6.7	In orbit: Geostationary Operational Environmental Satellite
Luna	None	USSR	Oct 16	Tyuratam	D-1-e						Lunar probe; failed to orbit
Kosmos 776	1975 101A	USSR	Oct 17	Plesetsk	A-2	4,000	89.4	203	310	62.8	Reentered 10/29/75: reconnaissance
Kosmos 777	1975 102A	USSR	Oct 29	Tyuratam	F-1-m	4,000	89.3	123	412	64.9	Decayed 6/3/76: monitoring. Exploded 1/25/76, 65 pieces
Kosmos 778	1975 103A	USSR	Nov 4	Plesetsk	C-1	810	104.8	968	1,001	83.0	In orbit: navigation
Kosmos 779	1975 104A	USSR	Nov 4	Plesetsk	A-2	4,000	89.4	188	334	62.8	Reentered 11/18/75: reconnaissance
Molniya 3-3	1975 105A	USSR	Nov 14	Plesetsk	A-2-e	1,500	717.9	2,188	38,170	64.0	In orbit: domestic communications
Soyuz 20	1975 106A	USSR	Nov 17	Tyuratam	A-2	6,570	91.3	339	345	51.5	Reentered 2/16/76: docked with Salyut 4
Explorer 55	1975 107A	US	Nov 20	ETR	Delta	721	93.6	447	449	19.6	Decayed 6/10/81: atmospheric
Kosmos 780	1975 108A	USSR	Nov 21	Tyuratam	A-2	4,000	89.3	206	298	65.0	Reentered 12/3/75: reconnaissance

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 781	1975 109A	USSR	Nov 21	Plesetsk	C-1	900	95.1	506	549	74.0	Decayed 11/26/80: military elint
Kosmos 782	1975 110A	USSR	Nov 25	Plesetsk	A-2	4,000	90.5	227	405	62.8	Reentered 12/15/75: biological research
China 4	1975 111A	PRC	Nov 26	Shuang Cheng Tzu	CZ-2	2,500	91.0	179	479	62.9	Decayed 12/29/75
Kosmos 783	1975 112A	USSR	Nov 28	Plesetsk	C-1	750	100.8	787	805	74.1	In orbit: military communications
Kosmos 784	1975 113A	USSR	Dec 3	Plesetsk	A-2	4,000	89.0	216	252	81.3	Reentered 12/15/75: reconnaissance—ice survey
None	1975 114A	US	Dec 4	WTR	Titan IIID	13,300	88.4	157	240	96.2	Reentered 4/1/76
None	1975 114B	US	Dec 4	WTR	Titan IIID	60	103	236	1,558	96.3	Decayed 5/1/78
Explorer	None	US	Dec 5	WTR	Scout	71					Failed to orbit (Dual air density)
Interkosmos 14	1975 115A	USSR	Dec 11	Plesetsk	C-1	700	96.5	300	883	74.0	Decayed 2/27/83: scientific
Kosmos 785	1975 116A	USSR	Dec 12	Tyuratam	F-1-m	4,500	104.2	887	1,025	65.1	In orbit: ocean surveillance
Satcom-1	1975 117A	US	Dec 13	ETR	Delta	464	1,445.8	35,878	36,075	2.7	In orbit: U.S. domestic communications
None	1975 118A	US	Dec 14	ETR	Titan IIIC	820	1,433.4	35,621	35,844	4.4	In orbit: military communications
China 5	1975 119A	PRC	Dec 16	Shuang Cheng Tzu	CZ-2	2,500	89.9	187	360	68.9	Decayed 1/27/76
Kosmos 786	1975 120A	USSR	Dec 16	Tyuratam	A-2	4,000	89.5	180	347	65.0	Reentered 12/29/75: reconnaissance
Molniya 2-15	1975 121A	USSR	Dec 17	Plesetsk	A-2-e	1,250	717.8	1,325	39,031	64.1	Decayed 3/7/87. Domestic communications
Prognoz 4	1975 122A	USSR	Dec 22	Tyuratam	A-2-e	905	5,740	634	199,000	65.0*	In orbit: scientific
Raduga 1	1975 123A	USSR	Dec 22	Tyuratam	D-1-e	5,000	1,316.7	33,395	33,437	3.5	In orbit: communications
Meteor 23	1975 124A	USSR	Dec 25	Plesetsk	A-1	2,200	102.2	842	885	81.3	In orbit: weather
Molniya 3-4	1975 125A	USSR	Dec 27	Plesetsk	A-2-e	1,500	718.1	1,294	39,074	64.1	Decayed 8/12/85. Domestic communications
Kosmos 787	1976 1A	USSR	Jan 6	Plesetsk	C-1	900	95.2	516	545	74.0	Decayed 12/12/80: ferret
Kosmos 788	1976 2A	USSR	Jan 7	Plesetsk	A-2	4,000	89.5	183	321	62.8	Reentered 1/20/76: reconnaissance
Helios 2	1976 3A	FRG	Jan 15	ETR	Titan IIIE Centaur	376		Heliocentric Orbit			In orbit: solar probe
CTS	1976 4A	Can	Jan 17	ETR	Delta	500	1,436.5	35,735	35,855	7.2	In orbit: Canadian communications

*Initial elements, current elements unknown

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 789	1976 5A	USSR	Jan 20	Plesetsk	C-1	810	104.9	966	1,013	83.0	In orbit: navigation
Molniya 1-32	1976 6A	USSR	Jan 22	Tyuratam	A-2-e	1,000	720.4	2,425	38,060	63.7	In orbit: domestic communications
Kosmos 790	1976 7A	USSR	Jan 22	Plesetsk	C-1	900	95.1	511	549	74.0	Decayed 11/12/80: ferret
Kosmos 791	1976 8A	USSR	Jan 28	Plesetsk	C-1	40	114.7	1,400	1,484	74.0	In orbit: military commsat
Kosmos 792	1976 8B	USSR	Jan 28	Plesetsk	C-1	40	115.1	1,434	1,488	74.1	In orbit: commsat
Kosmos 793	1976 8C	USSR	Jan 28	Plesetsk	C-1	40	114.9	1,416	1,488	74.1	In orbit: military commsat
Kosmos 794	1976 8D	USSR	Jan 28	Plesetsk	C-1	40	115.3	1,450	1,492	74.0	In orbit: military commsat
Kosmos 795	1976 8E	USSR	Jan 28	Plesetsk	C-1	40	115.6	1,464	1,497	74.1	In orbit: military commsat
Kosmos 796	1976 8F	USSR	Jan 28	Plesetsk	C-1	40	115.8	1,469	1,514	74.1	In orbit: military commsat
Kosmos 797	1976 8G	USSR	Jan 28	Plesetsk	C-1	40	116.0	1,476	1,528	74.1	In orbit: military commsat
Kosmos 798	1976 8H	USSR	Jan 28	Plesetsk	C-1	40	116.3	1,476	1,553	74.1	In orbit: military commsat
Kosmos 799	1976 9A	USSR	Jan 29	Tyuratam	A-2	4,000	89.6	210	328	71.4	Reentered 2/10/76: reconnaissance
Intelsat IVA F-2	1976 10A	COMSAT	Jan 30	ETR	Atlas Centaur	1,500	1,442.7	35,904	35,926	2.6	In orbit: communications
Kosmos 800	1976 11A	USSR	Feb 3	Plesetsk	C-1	650	105.0	977	1,010	83.0	In orbit: navigation
Corsa	–	Japan	Feb 4	Uchinoura	Mu-3C	92	–	–	–	–	Failed to reach orbit
Kosmos 801	1976 12A	USSR	Feb 5	Plesetsk	B-1	400	93.9	260	677	70.9	Decayed 1/5/78: minor military
Kosmos 802	1976 13A	USSR	Feb 11	Tyuratam	A-2	4,000	89.6	180	355	65.0	Reentered 2/25/76: reconnaissance
Kosmos 803	1976 14A	USSR	Feb 12	Plesetsk	C-1	300	96.0	536	594	65.8	In orbit: interceptor target
Kosmos 804	1976 15A	USSR	Feb 16	Tyuratam	F-1-m	2,000	93.0	149	703	65.1	Reentered 2/16/76: interceptor
DMSP	1976 16A	US	Feb 19	WTR	Thor Burner II	175	89.0	90	355	98.9	Decayed 2/19/76
Marisat 1	1976 17A	COMSAT	Feb 19	ETR	Delta	655	1,436.1	35,770	35,803	2.2	In orbit: maritime communications
Kosmos 805	1976 18A	USSR	Feb 20	Plesetsk	A-2	4,000	89.7	181	372	67.2	Reentered 3/11/76: reconnaissance

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
UME (ISS 1)	1976 19A	Japan	Feb 29	Tanega shima	N 1	139	105.1	988	1,009	69.7	In orbit: ionospheric sounding
Kosmos 806	1976 20A	USSR	Mar 10	Tyuratam	A 2	4,000	89.7	182	353	71.4	Reentered 3/23/76: reconnaissance
Molniya 1-33	1976 21A	USSR	Mar 11	Plesetsk	A 2-e	1,000	717.8	1,178	39,176	62.9	In orbit: domestic communications
Kosmos 807	1976 22A	USSR	Mar 12	Plesetsk	C 1	400	106.7	388	1,760	82.9	In orbit: minor military
LES 8	1976 23A	USAF	Mar 15	ETR	Titan IIIC	454	1,435.6	35,764	35,788	22.1	In orbit: communications
LES 9	1976 23B	USAF	Mar 15	ETR	Titan IIIC	454	1,436.1	35,782	35,790	22.1	In orbit: communications
Solrad IIA	1976 23C	USAF	Mar 15	ETR	Titan IIIC	181	Current elements not maintained				In orbit: solar study
Solrad IIB	1976 23D	USAF	Mar 15	ETR	Titan IIIC	181	Current elements not maintained				In orbit: solar study
Kosmos 808	1976 24A	USSR	Mar 16	Plesetsk	A 1	3,000	95.8	544	569	81.2	In orbit: ferret
Kosmos 809	1976 25A	USSR	Mar 18	Tyuratam	A 2	4,000	89.6	210	322	65.0	Reentered 3/30/76: reconnaissance
Molniya 1-34	1976 26A	USSR	Mar 19	Tyuratam	A 2-e	1,000	718.0	1,352	39,012	64.0	Decayed 5/14/85: domestic communications
None	1976 27A	US	Mar 22	WTR	Titan IIIB Agena D	3,000	89.1	130	331	96.4	Reentered 5/18/76
Kosmos 810	1976 28A	USSR	Mar 26	Plesetsk	A 2	4,000	89.6	188	358	62.8	Reentered 4/8/76: reconnaissance
RCA Satcom-2	1976 29A	NASA	Mar 26	ETR	Delta	463	1,460.1	36,000	36,510	2.3	In orbit: domestic communications
Kosmos 811	1976 30A	USSR	Mar 31	Plesetsk	A 2	4,000	89.9	212	361	72.9	Reentered 4/12/76: reconnaissance
Kosmos 812	1976 31A	USSR	Apr 6	Plesetsk	C 1	900	95.1	509	544	74.0	Decayed 10/30/80: ferret
Meteor 24	1976 32A	USSR	Apr 7	Plesetsk	A 1	2,200	102.1	831	888	81.3	In orbit: weather
Kosmos 813	1976 33A	USSR	Apr 9	Plesetsk	A 2	4,000	89.0	212	250	81.3	Reentered 4/21/76: reconnaissance
Kosmos 814	1976 34A	USSR	Apr 13	Tyuratam	F-1 m	2,000	90.6	118	480	65.1	Reentered 4/13/76: interceptor
NATO III-A	1976 35A	NATO	Apr 22	ETR	Delta	310	1,436.3	35,779	35,799	5.3	In orbit: NATO communications
Kosmos 815	1976 36A	USSR	Apr 28	Plesetsk	A 2	4,000	89.0	218	254	81.3	Reentered 5/11/76: reconnaissance
Kosmos 816	1976 37A	USSR	Apr 28	Plesetsk	C 1	950	94.5	470	521	65.8	Decayed 11/24/79: interceptor program related
NOSS 1	1976 38A	US	Apr 30	WTR	Atlas	–	107.4	976	1,240	63.4	In orbit: Navy ocean surveillance

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
SSU-1	1976 38C	US	Apr 30	WTR	Atlas	–	107.5	971	1,246	63.4	In orbit: Navy ocean surveillance
SSU-2	1976 38D	US	Apr 30	WTR	Atlas	–	107.5	971	1,246	63.4	In orbit: Navy ocean surveillance
SSU-3	1976 38J	US	Apr 30	WTR	Atlas	–	107.5	975	1,242	63.4	In orbit: Navy ocean surveillance
LAGEOS-1	1976 39A	NASA	May 4	WTR	Delta	411	225.4	5,837	5,946	109.8	In orbit: laser ranging geodetic
Kosmos 817	1976 40A	USSR	May 5	Tyuratam	A-2	4,000	89.5	178	347	65.0	Reentered 5/18/76: reconnaissance
Molniya 3-5	1976 41A	USSR	May 12	Plesetsk	A-2-e	1,500	714.7	394	39,808	62.8	In orbit: domestic communications
Comstar 1	1976 42A	COMSAT	May 13	ETR	Atlas-Centaur	792	1,436.2	35,758	35,820	3.8	In orbit: domestic communications
Meteor 25	1976 43A	USSR	May 15	Plesetsk	A-1	2,200	102.1	832	884	81.3	In orbit: weather
Kosmos 818	1976 44A	USSR	May 18	Plesetsk	B-1	400	90.5	247	359	71.0	Decayed 3/7/77: minor military
Kosmos 819	1976 45A	USSR	May 20	Tyuratam	A-2	4,000	89.5	204	307	65.0	Reentered 6/1/76: reconnaissance
Kosmos 820	1976 46A	USSR	May 21	Plesetsk	A-2	4,000	88.8	214	236	81.4	Reentered 6/2/76: reconnaissance
P 76-5	1976 47A	USAF	May 22	WTR	Scout	73	105.5	987	1,051	99.6	In orbit: communication propogation experiment
Kosmos 821	1976 48A	USSR	May 26	Plesetsk	A-2	4,000	89.7	212	338	72.8	Reentered 6/8/76: reconnaissance
Kosmos 822	1976 49A	USSR	May 28	Plesetsk	C-1	550	94.1	276	677	74.0	Decayed 8/8/78: minor military
None	1976 50A	USAF	Jun 2	WTR	Titan IIIB	700	Current elements not maintained				In orbit
Kosmos 823	1976 51A	USSR	Jun 2	Plesetsk	C-1	650	104.9	971	1,007	83.0	In orbit: navigation
Kosmos 824	1976 52A	USSR	Jun 8	Tyuratam	A-2	4,000	89.8	209	345	71.4	Reentered 6/21/76: reconnaissance
Marisat 2	1976 53A	US	Jun 10	ETR	Delta	362	1,436.1	35,779	35,796	4.4	In orbit: maritime commsat
Kosmos 825	1976 54A	USSR	Jun 15	Plesetsk	C-1	40	114.7	1,393	1,485	74.0	In orbit: military commsat
Kosmos 826	1976 54B	USSR	Jun 15	Plesetsk	C-1	40	116.2	1,479	1,543	74.0	In orbit: military commsat
Kosmos 827	1976 54C	USSR	Jun 15	Plesetsk	C-1	40	114.9	1,410	1,488	74.0	In orbit: military commsat
Kosmos 828	1976 54D	USSR	Jun 15	Plesetsk	C-1	40	115.1	1,431	1,487	74.0	In orbit: military commsat
Kosmos 829	1976 54E	USSR	Jun 15	Plesetsk	C-1	40	115.3	1,448	1,488	74.0	In orbit: military commsat
Kosmos 830	1976 54F	USSR	Jun 15	Plesetsk	C-1	40	115.5	1,467	1,490	74.0	In orbit: military commsat

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 831	1976 54G	USSR	Jun 15	Plesetsk	C-1	40	115.8	1,473	1,505	74.0	In orbit: military commsat
Kosmos 832	1976 54H	USSR	Jun 15	Plesetsk	C-1	40	116.0	1,481	1,518	74.0	In orbit: military commsat
Kosmos 833	1976 55A	USSR	Jun 16	Plesetsk	A-2	4,000	89.5	189	335	62.8	Reentered 6/29/76: reconnaissance
Interkosmos 15	1976 56A	USSR	Jun 19	Plesetsk	C-1	550	94.5	483	515	74.0	Decayed 11/18/79: scientific
Salyut 5	1976 57A	USSR	Jun 22	Tyuratam	D-1	19,000	89.2	230	245	51.5	Reentered 8/8/77: space station. Capsule ejected 2/26/77
Kosmos 834	1976 58A	USSR	Jun 24	Plesetsk	A-2	4,000	89.1	223	263	81.4	Reentered 7/6/76: arctic survey
None	1976 59A	USAF	Jun 26	ETR	Titan IIIC	820	Current elements not maintained				In orbit
Kosmos 835	1976 60A	USSR	Jun 29	Tyuratam	A-2	4,000	89.4	180	338	65.0	Reentered 7/12/76: reconnaissance
Kosmos 836	1976 61A	USSR	Jun 29	Plesetsk	C-1	750	100.8	781	809	74.1	In orbit: specialized military communications
Kosmos 837	1976 62A	USSR	Jul 1	Plesetsk	A-2-e	1,250	94.3	394	576	62.7	Decayed 11/18/83
Kosmos 838	1976 63A	USSR	Jul 2	Tyuratam	F-1-m	4,500	93.3	428	448	65.0	Decayed 8/23/77: ocean surveillance. Exploded 5/17/77, 41 pieces
Soyuz 21	1976 64A	USSR	Jul 6	Tyuratam	A-2	6,570	88.7	193	253	51.6	Reentered 8/24/76: Boris Volynov, Vitali Zholobov aboard. Docked with Salyut 5. Mission duration 49 days, 6 hrs, 24 mn
None	1976 65A	USAF	Jul 8	WTR	Titan IIID	13,000	88.4	156	234	97.01	Reentered 12/13/76
SESP74-2	1976 65B	USAF	Jul 8	WTR	Titan IIID	–	179	236	8,048	97.5	Decayed 4/24/86
None	1976 65C	USAF	Jul 8	WTR	Titan IIID	60	Current elements not maintained				In orbit
Palapa 1	1976 66A	Indo	Jul 8	ETR	Delta	300	1,436.3	35,765	35,818	0.8	In orbit: Indonesian communications
Kosmos 839	1976 67A	USSR	Jul 8	Plesetsk	C-1	400	115.7	916	2,054	65.9	In orbit: interceptor target. Exploded 9/29/77, 56 pieces
Kosmos 840	1976 68A	USSR	Jul 14	Plesetsk	A-2	4,000	89.7	212	343	72.9	Reentered 7/26/76: reconnaissance
Kosmos 841	1976 69A	USSR	Jul 15	Plesetsk	C-1	750	100.6	777	798	74.0	In orbit: specialized military commsat
Kosmos 842	1976 70A	USSR	Jul 21	Plesetsk	C-1	650	104.8	965	1,006	83.0	In orbit: navigation
Kosmos 843	1976 71A	USSR	Jul 21	Tyuratam	F-1-m	2,000	89.4	132	346	65.1	Reentered 7/21/76: interceptor
Kosmos 844	1976 72A	USSR	Jul 22	Plesetsk	A-2	4,000	89.8	181	385	67.1	Reentered 8/30/76: reconnaissance. Exploded 7/25/76, 249 pieces

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Comstar 2	1976 73A	COMSAT	Jul 22	ETR	Atlas Centaur	792	1,436.2	35,785	35,791	2.4	In orbit: domestic communications
Molniya 1-35	1976 74A	USSR	Jul 23	Tyuratam	A-2-e	1,000	717.9	973	39,386	64.0	Decayed 5/29/87. Communications
Kosmos 845	1976 75A	USSR	Jul 27	Plesetsk	C-1	900	95.2	510	548	74.0	Decayed 11/15/80: ferret
Interkosmos 16	1976 76A	USSR	Jul 27	Kapustin Yar	C-1	550	94.4	463	518	50.5	Decayed 7/10/79: solar X-rays
NOAA 5	1976 77A	NOAA/ US	Jul 29	WTR	Delta	340	116.2	1,503	1,519	101.9	In orbit: weather. 2nd stage exploded 12/24/76, 140 pieces in orbit
Kosmos 846	1976 78A	USSR	Jul 29	Plesetsk	C-1	650	104.7	948	1,009	82.9	In orbit: navigation
Kosmos 847	1976 79A	USSR	Aug 4	Plesetsk	A-2	4,000	89.5	189	342	62.8	Reentered 8/17/76: reconnaissance
Satellite Data Systems 2	1976 80A	US	Aug 6	WTR	Titan IIIB Agena	700	Current elements not maintained				In orbit
Luna 24	1976 81A	USSR	Aug 9	Tyuratam	D-1-e	4,800	Trans lunar trajectory				Recovered 8/18/76: lunar sample return
Kosmos 848	1976 82A	USSR	Aug 12	Plesetsk	A-2	4,000	89.6	214	325	62.8	Reentered 8/25/76: reconnaissance
Kosmos 849	1976 83A	USSR	Aug 18	Plesetsk	B-1	400	95.3	260	813	70.9	Decayed 8/24/78: minor military
Kosmos 850	1976 84A	USSR	Aug 26	Plesetsk	B-1	400	91.4	259	432	70.9	Decayed 5/16/77: minor military
Kosmos 851	1976 85A	USSR	Aug 27	Plesetsk	A-1	3,000	94.0	453	490	81.2	In orbit: ferret
Kosmos 852	1976 86A	USSR	Aug 28	Tyuratam	A-2	4,000	89.5	179	354	65.0	Reentered 9/10/76: reconnaissance
China 6	1976 87A	PRC	Aug 30	Shuang Cheng Tzu	CZ-2	2,500	107.5	194	2,030	69.0	Decayed 11/25/78: ferret
Kosmos 853	1976 88A	USSR	Sep 1	Plesetsk	A-2-e	1,250	91.7	243	461	62.8	Decayed 12/31/76: failed molniya
Tip 3	1976 89A	NASA/ Navy	Sep 1	WTR	Scout	94	93.9	380	548	89.3	Decayed 5/30/81: transit navsat
Kosmos 854	1976 90A	USSR	Sep 3	Plesetsk	A-2	4,000	88.9	163	278	81.3	Reentered 9/16/76: reconnaissance
AMS 1	1976 91A	US	Sep 11	WTR	Thor Burner 2	450	101.3	806	834	98.6	In orbit: weather
Raduga 2	1976 92A	USSR	Sep 11	Tyuratam	D-1-e	2,000	1,433.6	26,783	44,692	2.4	In orbit: communications

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Soyuz 22	1976 93A	USSR	Sep 15	Tyuratam	A-2	6,570	89.6	250	280	65.0	Returned 9/23/76: Valeri Bykovsky, Vladimir Aksyonov aboard. 7 days, 21 hrs, 52 mn
None	1976 94A	US	Sep 15	WTR	Titan IIIB-Agena	3,000	89.2	134	336	96.3	Reentered 11/5/76
Kosmos 855	1976 95A	USSR	Sep 21	Plesetsk	A-2	4,000	89.9	212	366	72.9	Reentered 10/3/76: reconnaissance
Kosmos 856	1976 96A	USSR	Sep 22	Tyuratam	A-2	4,000	89.5	210	322	65.0	Reentered 10/5/76: reconnaissance
Kosmos 857	1976 97A	USSR	Sep 24	Plesetsk	A-2	4,000	89.5	185	346	62.8	Reentered 10/7/76: reconnaissance
Kosmos 858	1976 98A	USSR	Sep 29	Plesetsk	C-1	1,750	100.7	783	802	74.1	In orbit: specialized military communications
Kosmos 859	1976 99A	USSR	Oct 10	Tyuratam	A-2	4,000	89.6	180	360	65.0	Reentered 10/21/76: reconnaissance
Soyuz 23	1976 100A	USSR	Oct 14	Tyuratam	A-2	6,570	89.5	243	275	51.6	Returned 10/16/76: Vyacheslav Zudov, Valeri Rozhdestvensky aboard. Salyut 5 rendezvous failed; emergency landing after 2 days, 6 mn
Marisat 3	1976 101A	US	Oct 14	ETR	Delta	362	1,436.1	35,780	35,791	5.9	In orbit: maritime communications
Meteor 26	1976 102A	USSR	Oct 15	Plesetsk	A-1	2,200	102.3	848	885	81.3	In orbit: weather
Kosmos 860	1976 103A	USSR	Oct 17	Tyuratam	F-1-m	4,500	104.3	930	990	64.7	In orbit: ocean surveillance
Kosmos 861	1976 104A	USSR	Oct 21	Tyuratam	F-1-m	4,500	104.2	919	999	64.9	In orbit: ocean surveillance
Kosmos 862	1976 105A	USSR	Oct 22	Plesetsk	A-2-e	1,250	717.8	2,857	37,497	67.3	In orbit: early warning. Exploded 3/15/77, 14 pieces
Kosmos 863	1976 106A	USSR	Oct 22	Plesetsk	A-2	4,000	89.8	187	370	62.8	Reentered 11/1/76: reconnaissance
EKRAN	1976 107A	USSR	Oct 26	Tyuratam	D-1-e	2,000	1,435.7	35,511	36,044	7.6	In orbit: communications
Kosmos 864	1976 108A	USSR	Oct 29	Plesetsk	C-1	810	104.7	959	1,005	82.9	In orbit: navigation
Kosmos 865	1976 109A	USSR	Nov 1	Plesetsk	A-2	4,000	89.8	212	350	72.9	Reentered 11/13/76: reconnaissance
Kosmos 866	1976 110A	USSR	Nov 11	Tyuratam	A-2	4,000	89.1	182	306	65.0	Reentered 11/23/76: reconnaissance
Kosmos 867	1976 111A	USSR	Nov 23	Plesetsk	A-2	4,000	91.0	258	418	62.8	Reentered 12/6/76: reconnaissance
Prognoz 5	1976 112A	USSR	Nov 25	Tyuratam	A-2-e	930	5,713	510	19,900	65*	In orbit: scientific
Kosmos 868	1976 113A	USSR	Nov 26	Tyuratam	F-1-m	4,500	93.2	422	443	65.0	Decayed 7/8/78: ocean surveillance
Kosmos 869	1976 114A	USSR	Nov 29	Tyuratam	A-2	6,570	89.3	202	307	51.8	Reentered 12/17/76: unmanned Soyuz

*Initial elements. Current elements unknown

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 870	1976 115A	USSR	Dec 2	Plesetsk	C-1	900	95.2	513	548	73.9	Decayed 12/20/80: ferret
Molniya 2-16	1976 116A	USSR	Dec 2	Plesetsk	A-2-e	1,250	718.3	746	39,622	63.2	In orbit: domestic communications
China 7	1976 117A	PRC	Dec 7	Shuang Cheng Tzu	CZ-2	2,500	89.0	163	293	59.4	Reentered 1/2/77: reconnaissance
Kosmos 871	1976 118A	USSR	Dec 7	Plesetsk	C-1	40	114.6	1,415	1,463	74.0	In orbit: military commsat
Kosmos 872	1976 118B	USSR	Dec 7	Plesetsk	C-1	40	114.4	1,396	1,462	74.0	In orbit: military commsat
Kosmos 873	1976 118C	USSR	Dec 7	Plesetsk	C-1	40	115.5	1,462	1,494	74.0	In orbit: military commsat
Kosmos 874	1976 118D	USSR	Dec 7	Plesetsk	C-1	40	115.7	1,463	1,513	74.0	In orbit: military commsat
Kosmos 875	1976 118E	USSR	Dec 7	Plesetsk	C-1	40	114.9	1,434	1,462	74.0	In orbit: military commsat
Kosmos 876	1976 118F	USSR	Dec 7	Plesetsk	C-1	40	116.0	1,463	1,536	74.0	In orbit: military commsat
Kosmos 877	1976 118G	USSR	Dec 7	Plesetsk	C-1	40	115.1	1,452	1,463	74.0	In orbit: military commsat
Kosmos 878	1976 118H	USSR	Dec 7	Plesetsk	C-1	40	115.3	1,463	1,472	74.0	In orbit: military commsat
Kosmos 879	1976 119A	USSR	Dec 9	Plesetsk	A-1	4,000	88.9	217	241	81.4	Reentered 12/22/76: reconnaissance
Kosmos 880	1976 120A	USSR	Dec 9	Plesetsk	C-1	900	96.4	559	617	65.8	Decayed 10/8/79: interceptor target. Exploded 11/27/78, 50 pieces
Kosmos 881	1976 121A	USSR	Dec 15	Tyuratam	D-1	6,000	88.7	202	248	51.6	Reentered 12/15/76: man-related
Kosmos 882	1976 121B	USSR	Dec 15	Tyuratam	D-1	6,000	88.4	202	248	51.6	Reentered 12/15/76
Kosmos 883	1976 122A	USSR	Dec 15	Plesetsk	C-1	810	104.7	955	1,005	83.0	In orbit: navigation
Kosmos 884	1976 123A	USSR	Dec 17	Tyuratam	A-2	4,000	89.6	178	346	65.0	Decayed 12/29/76: reconnaissance
Kosmos 885	1976 124A	USSR	Dec 17	Plesetsk	C-1	900	94.3	467	511	65.8	Decayed 10/14/79: interceptor related
None	1976 125A	US	Dec 19	WTR	Titan IIID	13,300	93.3	342	533	96.9	Reentered 1/28/79
Kosmos 886	1976 126A	USSR	Dec 27	Tyuratam	F-1-m	2,000	111.2	489	2,087	65.8	In orbit: ASAT warhead. 60 pieces in orbit
Molniya 3-6	1976 127A	USSR	Dec 28	Plesetsk	A-2-e	1,500	699.1	234	39,187	64.1	In orbit: domestic communications
Kosmos 887	1976 128A	USSR	Dec 28	Plesetsk	C-1	810	104.7	947	1,012	82.9	In orbit: navigation
Kosmos 888	1977 1A	USSR	Jan 6	Tyuratam	A-2	4,000	89.5	178	346	65	Reentered 1/9/77: reconnaissance

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Meteor 2-2	1977 2A	USSR	Jan 6	Plesetsk	A-1	2,750	102.8	881	898	81.3	In orbit: weather
Kosmos 889	1977 3A	USSR	Jan 20	Tyuratam	A-2	4,000	89.8	210	353	71.4	Reentered 2/1/77: reconnaissance
Kosmos 890	1977 4A	USSR	Jan 20	Plesetsk	C-1	700	105.0	976	1,015	83.0	In orbit: navigation
NATO III B	1977 5A	NATO	Jan 28	ETR	Delta	701	1,436.0	35,779	35,790	5.7	In orbit: NATO communications
Kosmos 891	1977 6A	USSR	Feb 2	Plesetsk	C-1	900	90.1	276	286	65.8	Decayed 2/4/81: military
None	1977 7A	USAF	Feb 6	ETR	Titan IIIC	820	1436.1	35,776	35,798	2.7	In orbit
Soyuz 24	1977 8A	USSR	Feb 7	Tyuratam	A-2	6,570	89.4	173	323	51.6	Returned 2/25/77: Viktor Gorbatko, Yuri Glazkov docked with Salyut 5. Mission: 17 days, 17 hrs, 26 mn
Kosmos 892	1977 9A	USSR	Feb 9	Plesetsk	A-2	4,000	90.4	170	454	72.9	Reentered 2/22/77: reconnaissance
Molniya 2-17	1977 10A	USSR	Feb 11	Plesetsk	A-2-e	1,250	717.9	2,250	38,110	62.7	In orbit: domestic communications
Kosmos 893	1977 11A	USSR	Feb 15	Plesetsk	C-1	550	98.0	306	1,022	73.9	Decayed 10/6/84: scientific
Tansei 3	1977 12A	Japan	Feb 19	Uchinoura	Mu-3H	230	134.1	800	3,803	65.8	In orbit
Kosmos 894	1977 13A	USSR	Feb 21	Plesetsk	C-1	810	104.8	963	1,010	82.9	In orbit: navigation
Kiku 2	1977 14A	Japan	Feb 23	Tanega shima	N-1	130	1,436.3	35,785	35,791	5.8	In orbit. engineering test satellite
Kosmos 895	1977 15A	USSR	Feb 26	Plesetsk	A-1	2,500	95.7	545	563	81.2	In orbit: ferret
Kosmos 896	1977 16A	USSR	Mar 3	Plesetsk	A-2	4,000	88.5	194	216	72.9	Reentered 3/16/77: reconnaissance
Kosmos 897	1977 17A	USSR	Mar 10	Plesetsk	A-2	4,000	89.7	182	371	72.9	Reentered 3/23/77: reconnaissance
Palapa 2	1977 18A	Indo	Mar 10	ETR	Delta	574	1,435.8	35,750	35,811	8.9	In orbit: Indonesian communications
None	1977 19A	USAF	Mar 13	WTR	Titan IIIB Agena	3,000	89.3	122	357	96.39	Reentered 5/26/77
Kosmos 898	1977 20A	USSR	Mar 17	Plesetsk	A-2	4,000	89.0	222	258	81.4	Reentered 3/30/77: reconnaissance
Molniya 1-36	1977 21A	USSR	Mar 24	Plesetsk	A-2-e	1,000	717.9	2,196	8,162	63.7	In orbit: domestic communications
Kosmos 899	1977 22A	USSR	Mar 24	Plesetsk	C-1	900	95.0	500	547	74.0	Decayed 10/19/80: ferret
Kosmos 900	1977 23A	USSR	Mar 29	Plesetsk	C-1	900	94.2	457	522	82.9	Decayed 10/11/79: scientific

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Meteor 1-27	1977 24A	USSR	Apr 5	Plesetsk	A-1	2,200	102.3	846	892	81.3	In orbit: weather
Kosmos 901	1977 25A	USSR	Apr 5	Plesetsk	B-1	400	94.4	262	725	70.9	Decayed 6/28/78: military
Kosmos 902	1977 26A	USSR	Apr 7	Plesetsk	A-2	4,000	89	179	307	81.4	Reentered 4/20/77: reconnaissance
Kosmos 903	1977 27A	USSR	Apr 11	Plesetsk	A-2-e	1,250	717.2	4,688	35,639	67.4	In orbit. Exploded 6/8/78, 5 pieces
Kosmos 904	1977 28A	USSR	Apr 20	Tyuratam	A-2	4,000	89.8	210	350	71.[illegible]	Reentered 5/4/77: reconnaissance
ESA-GEOS	1977 29A	ESA	Apr 20	ETR	Delta	573	734.1	2,682	38,475	26.6	In orbit: European Space Agency scientific
Kosmos 905	1977 30A	USSR	Apr 26	Plesetsk	A-2	4,000	89.7	179	366	67.1	Reentered 5/26/77: reconnaissance
Kosmos 906	1977 31A	USSR	Apr 27	Kapustin Yar	C-1	550	94.3	461	511	50.6	Decayed 3/23/80: scientific
Molniya 3-7	1977 32A	USSR	Apr 28	Plesetsk	A-2-e	1,500	717.9	2,235	38,125	63.9	In orbit: domestic communications
Kosmos 907	1977 33A	USSR	May 5	Plesetsk	A-2	4,000	89.9	187	388	62.8	Reentered 5/16/77: reconnaissance
DSCS II-C7	1977 34A	USAF	May 12	ETR	Titan IIIC	565	1,489.6	36,747	36,907	6.1	In orbit: military communications
DSCS II-C8	1977 34B	USAF	May 12	ETR	Titan IIIC	565	1,436.1	35,776	36,796	6.8	In orbit: military communications
Kosmos 908	1977 35A	USSR	May 17	Tyuratam	A-2	4,000	89.1	180	307	51.8	Reentered 5/31/77: reconnaissance
Kosmos 909	1977 36A	USSR	May 19	Plesetsk	C-1	500	117.0	982	2,111	65.9	In orbit: interceptor target
Kosmos 910	1977 37A	USSR	May 23	Tyuratam	F-1-m	2,000	91.0	149	506	65.1	Reentered 5/23/77: interceptor
None	1977 38A	USAF	May 23	ETR	Atlas Agena	700	Current elements not maintained				In orbit
Kosmos 911	1977 39A	USSR	May 25	Plesetsk	C-1	700	104.7	965	998	82.9	In orbit: navigation
Kosmos 912	1977 40A	USSR	May 26	Plesetsk	A-2	4,000	89.0	219	257	81.4	Reentered 6/8/77: earth resources
Intelsat IVA F-4	1977 41A	CSC	May 26	ETR	Atlas Centaur	1,500	1,436.1	35,779	35,797	1.5	In orbit: communications
Kosmos 913	1977 42A	USSR	May 30	Plesetsk	C-1	550	94.4	471	517	74.0	Decayed 12/29/79: military
Kosmos 914	1977 43A	USSR	May 31	Tyuratam	A-2	4,000	89.6	210	327	65	Reentered 6/13/77: reconnaissance
DMSP	1977 44A	USAF	Jun 5	WTR	Thor Burner II	450	101.3	789	853	99.0	In orbit: weather

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 915	1977 45A	USSR	Jun 8	Plesetsk	A-2	4,000	89.1	182	306	62.8	Reentered 6/21/77: reconnaissance
Kosmos 916	1977 46A	USSR	Jun 10	Plesetsk	A-2	4,000	89.9	250	307	62.8	Reentered 6/21/77: reconnaissance
Kosmos 917	1977 47A	USSR	Jun 16	Plesetsk	A-2-e	1,250	716.9	5,317	34,992	67.8	In orbit. Exploded 3/30/79, 4 pieces
GOES 2	1977 48A	NOAA	Jun 16	ETR	Delta	627	1,436.3	35,757	35,821	5.8	In orbit: weather
SIGNE 3	1977 49A	France	Jun 17	Kapustin Yar	C-1	102	94.3	456	515	50.6	Decayed 6/20/79: scientific
Kosmos 918	1977 50A	USSR	Jun 17	Tyuratam	F-1-m	2,000	88.4	131	265	65.1	Reentered 6/18/77: interceptor
Kosmos 919	1977 51A	USSR	Jun 18	Plesetsk	B-1	400	95.5	269	882	71.0	Decayed 8/28/78: military
Kosmos 920	1977 52A	USSR	Jun 22	Tyuratam	A-2	4,000	89.6	180	364	65	Reentered 7/5/77: reconnaissance
NTS-2	1977 53A	Navy	Jun 23	WTR	Atlas F	431	717.9	20,121	20,236	64.0	In orbit: Navigation Technical Satellite; 1st Navstar precursor
Molynia 1-37	1977 54A	USSR	Jun 24	Tyuratam	A-2-e	1,000	717.8	964	39,392	63.3	In orbit: domestic communications
Kosmos 921	1977 55A	USSR	Jun 24	Plesetsk	F-2	5,000	97.6	607	679	75.8	In orbit
None	1977 56A	USAF	Jun 27	WTR	Titan IIID	13,300	88.5	158	250	96.9	Reentered 12/23/77
Meteor 1-28	1977 57A	USSR	Jun 29	Tyuratam	A-1	2,200	95.9	543	583	97.4	In orbit: weather
Kosmos 922	1977 58A	USSR	Jun 30	Plesetsk	A-2	4,000	89.5	212	323	62.8	Reentered 7/13/77: reconnaissance
Kosmos 923	1977 59A	USSR	Jul 1	Plesetsk	C-1	750	100.8	788	809	74.1	In orbit: military communications
Kosmos 924	1977 60A	USSR	Jul 4	Plesetsk	C-1	900	95.2	513	550	74.0	Decayed 2/10/81: ferret
Kosmos 925	1977 61A	USSR	Jul 7	Plesetsk	A-1	2,500	95.8	550	566	81.2	In orbit: ferret
Kosmos 926	1977 62A	USSR	Jul 8	Plesetsk	C-1	810	105.0	967	1,018	82.9	In orbit: navigation
Kosmos 927	1977 63A	USSR	Jul 12	Plesetsk	A-2	4,000	90	178	403	89.6	Reentered 7/25/77: reconnaissance
Kosmos 928	1977 64A	USSR	Jul 13	Plesetsk	C-1	810	104.6	949	1,006	83.0	In orbit: navigation
Himawari (GMS-1)	1977 65A	Japan	Jul 14	ETR	Delta	670	1,436.0	35,771	35,801	4.8	In orbit: meteorological. 2nd stage exploded, 93 pieces in orbit
Kosmos 929	1977 66A	USSR	Jul 17	Tyuratam	D-1	19,000	90.6	301	308	51.5	Reentered 2/2/78: man-related. Capsule down 8/16/77
Kosmos 930	1977 67A	USSR	Jul 19	Plesetsk	C-1	2,750	94.5	481	512	74.0	Decayed 5/12/80: ferret
Kosmos 931	1977 68A	USSR	Jul 20	Plesetsk	A-2-e	1,250	718.8	3,984	36,418	67.9	In orbit. Exploded 10/24/77, 7 pieces

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 932	1977 69A	USSR	Jul 20	Tyuratam	A-2	4,000	89.5	180	342	65	Reentered 8/2/77: reconnaissance
Kosmos 933	1977 70A	USSR	Jul 22	Plesetsk	C-1	900	92.3	372	407	65.8	Decayed 11/1/78: military
Raduga 3	1977 71A	USSR	Jul 23	Tyuratam	D-1-e	2,000	1,437.3	35,781	35,841	7.1	In orbit: communications
Kosmos 934	1977 72A	USSR	Jul 27	Plesetsk	A-2	4,000	89.4	238	264	62.8	Reentered 8/9/77: reconnaissance
Kosmos 935	1977 73A	USSR	Jul 29	Plesetsk	A-2	4,000	89.2	225	276	81.3	Reentered 8/11/77: reconnaissance
Kosmos 936	1977 74A	USSR	Aug 3	Plesetsk	A-2	4,000	90.7	224	419	62.8	Reentered 8/22/77: biological
Kosmos		USSR	Aug 4	Tyuratam	D-1						Failed to orbit
HEAO 1	1977 75A	US	Aug 12	ETR	Atlas-Centaur	2,720	93.3	424	444	22.7	Decayed 3/15/79: High Energy Astronomy Observatory, survey X-ray sky
Voyager 2	1977 76A	US	Aug 20	ETR	Titan IIIE-Centaur	800	Solar System Escape Trajectory				Jupiter-Saturn flyby: reached Jupiter 7/9/79; reached Saturn 8/26/81; reached Uranus 1/24/86
Kosmos 937	1977 77A	USSR	Aug 24	Tyuratam	F-1-m	4,500	93.3	428	444	65.0	Decayed 10/19/78: ocean surveillance-ferret
Kosmos 938	1977 78A	USSR	Aug 24	Plesetsk	A-2	6,300	89.7	189	365	62.8	Reentered 9/6/77: reconnaissance
Kosmos 939	1977 79A	USSR	Aug 24	Plesetsk	C-1	40	114.8	1,429	1,461	74.0	In orbit: military commsat
Kosmos 940	1977 79B	USSR	Aug 24	Plesetsk	C-1	40	114.4	1,391	1,461	74.0	In orbit: military commsat
Kosmos 941	1977 79C	USSR	Aug 24	Plesetsk	C-1	40	114.6	1,411	1,461	74.0	In orbit: military commsat
Kosmos 942	1977 79D	USSR	Aug 24	Plesetsk	C-1	40	115.9	1,461	1,530	74.0	In orbit: military commsat
Kosmos 943	1977 79E	USSR	Aug 24	Plesetsk	C-1	40	115.0	1,448	1,461	74.0	In orbit: military commsat
Kosmos 944	1977 79F	USSR	Aug 24	Plesetsk	C-1	40	115.2	1,460	1,468	74.0	In orbit: military commsat
Kosmos 945	1977 79G	USSR	Aug 24	Plesetsk	C-1	40	115.4	1,461	1,488	74.0	In orbit: military commsat
Kosmos 946	1977 79H	USSR	Aug 24	Plesetsk	C-1	40	115.6	1,461	1,507	74.0	In orbit: military commsat
SIRIO	1977 80A	Italy	Aug 25	ETR	Delta	220	1,436.2	35,773	35,803	0.1	In orbit: experimental commsat
Kosmos 947	1977 81A	USSR	Aug 27	Plesetsk	A-2	5,900	89.7	211	346	72.8	Reentered 9/9/77: reconnaissance
Molniya 1-38	1977 82A	USSR	Aug 30	Plesetsk	A-2-e	1,000	718.0	655	39,709	63.9	In orbit: domestic communications
Kosmos 948	1977 83A	USSR	Sep 2	Plesetsk	A-2	5,900	89	217	265	89.4	Reentered 9/15/77: earth resources

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Voyager 1	1977 84A	US	Sep 5	ETR	Titan IIIE-Centaur	800	Solar System Escape Trajectory				Jupiter-Saturn flyby: reached Jupiter 3/5/79; reached Saturn 11/12/80
Kosmos 949	1977 85A	USSR	Sep 6	Plesetsk	A-2	6,700	89.5	184	348	62.8	Reentered 10/6/77: reconnaissance
OTS	–	ESA	Sep 13	ETR	Delta	865	–	–	–	–	Destroyed: launch vehicle malfunction
Kosmos 950	1977 86A	USSR	Sep 13	Plesetsk	A-2	5,700	89.4	213	305	62.8	Reentered 9/27/77: reconnaissance
Kosmos 951	1977 87A	USSR	Sep 13	Plesetsk	C-1	810	104.8	961	1,011	83.0	In orbit: navigation
Kosmos 952	1977 88A	USSR	Sep 16	Tyuratam	F-1-m	4,500	104.1	904	999	64.9	In orbit: ocean surveillance
Kosmos 953	1977 89A	USSR	Sep 16	Plesetsk	A-2	6,300	89.6	188	354	62.8	Reentered 9/29/77: reconnaissance
Kosmos 954	1977 90A	USSR	Sep 18	Tyuratam	F-1-m	4,500	89.6	251	264	64.9	Decayed 1/24/78: ocean surveillance
Kosmos 955	1977 91A	USSR	Sep 20	Plesetsk	A-1	2,500	96.5	586	593	81.2	In orbit: ferret
Ekran	1977 92A	USSR	Sep 20	Tyuratam	D-1-e	2,000	1,448.4	33,905	38,150	2.3	In orbit: TV communications
Prognoz 6	1977 93A	USSR	Sep 22	Tyuratam	A-2-e	910	5,688	498	197,900	65*	In orbit: scientific
None	1977 94A	USAF	Sep 23	WTR	Titan IIIB-Agena	3,000	89.3	120	363	96.5	Reentered 12/8/77
Kosmos 956	1977 95A	USSR	Sep 24	Plesetsk	F-2	5,000	92.2	291	475	75.8	Decayed 6/27/82
Interkosmos 17	1977 96A	USSR	Sep 24	Plesetsk	C-1	550	94.3	467	511	82.9	Decayed 11/8/79: scientific
Intelsat IVA	–	US	Sep 29	ETR	Atlas-Centaur	1,500	–	–	–	–	Destroyed: a launch vehicle malfunction
Salyut 6	1977 97A	USSR	Sep 29	Tyuratam	D-1	9,000	92.3	380	391	51.6	Reentered 7/29/82: space station
Kosmos 957	1977 98A	USSR	Sep 30	Tyuratam	A-2	6,300	89.8	172	359	65.0	Reentered 10/13/77: reconnaissance
Soyuz 25	1977 99A	USSR	Oct 9	Tyuratam	A-2	6,570	88.8	194	240	51.6	Returned 10/11/77: Vladimir Kovalyonok, Valeri Ryumin failed to dock with Salyut 6. Mission ended after 2 days, 46 mn
Kosmos 958	1977 100A	USSR	Oct 11	Plesetsk	A-2	6,300	90.5	255	375	62.8	Reentered 10/24/77: reconnaissance
None	None	USSR	Oct 14	Tyuratam	D-1-e						Failed to orbit
Kosmos 959	1977 101A	USSR	Oct 21	Plesetsk	C-1	900	94.3	144	834	65.8	Decayed 11/30/77 interceptor target
ISEE 1	1977 102A	ESA	Oct 22	ETR	Delta	340	3,440.5	2,392	135,839	23.0	Decayed 9/26/87. International Sun-Earth Explorer

*Initial elements

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
ISEE 2	1977 102B	ESA	Oct 22	ETR	Delta	166	3,440.5	2,400	135,830	23.0	Decayed 9/26/87. International Sun-Earth Explorer
Kosmos 960	1977 103A	USSR	Oct 25	Plesetsk	C-1	900	95.1	501	545	74.0	Decayed 10/22/80: ferret
Kosmos 961	1977 104A	USSR	Oct 26	Tyuratam	F-1-m	2,000	101.8	269	1,432	66.4	Reentered 10/26/77: interceptor
Molniya 3-8	1977 105A	USSR	Oct 28	Plesetsk	A-2-e	1,500	717.5	1,262	39,078	63.9	In orbit: domestic communications (hot line)
Transat	1977 106A	Navy	Oct 28	WTR	Scout	94	106.9	1,062	1,101	89.9	In orbit: Navy navigation
Kosmos 962	1977 107A	USSR	Oct 28	Plesetsk	C-1	700	104.8	962	1,006	83.0	In orbit: navigation
Meteosat 1	1977 108A	ESA	Nov 23	ETR	Delta	697	1,436.2	34,755	36,823	6.1	In orbit: weather
Kosmos 963	1977 109A	USSR	Nov 24	Plesetsk	C-1	650	109.2	1,175	1,206	82.9	In orbit
Kosmos 964	1977 110A	USSR	Dec 4	Plesetsk	A-2	6,300	89.8	171	362	72.8	Reentered 12/17/77
Kosmos 965	1977 111A	USSR	Dec 8	Plesetsk	C-1	550	94.3	465	515	74.0	Decayed 12/16/79
NOSS-2	1977 112A	Navy	Dec 8	WTR	Atlas F	–	Elements not available				In orbit: Navy Ocean Surveillance Satellite
SSU-4	1977 112D	Navy	Dec 8	WTR	Atlas F	–	Elements not available				In orbit
SSU-5	1977 112E	Navy	Dec 8	WTR	Atlas F	–	Elements not available				In orbit
SSU-6	1977 112F	Navy	Dec 8	WTR	Atlas F	–	Elements not available				In orbit
Soyuz 26	1977 113A	USSR	Dec 10	Tyuratam	A-2	6,570	91.3	332	351	51.5	Returned 1/16/78 with visiting Soyuz 27 cosmonauts. Yuri Romanenko, Georgi Grechko docked with Salyut 6, remained for 96 days, 10 hrs, returned on Soyuz 27
None	1977 114A	USAF	Dec 11	ETR	Atlas-Agena D	700	Current elements not maintained				In orbit
Kosmos 966	1977 115A	USSR	Dec 12	Tyuratam	A-2	5,700	89.5	204	296	65.0	Reentered 12/24/77
Kosmos 967	1977 116A	USSR	Dec 13	Plesetsk	C-1	700	104.7	969	993	65.8	In orbit
Meteor 2-3	1977 117A	USSR	Dec 14	Plesetsk	A-1	2,700	102.3	846	886	81.2	In orbit
Sakura	1977 118A	Japan	Dec 15	ETR	Delta	676	1,455.9	36,161	36,183	5.3	In orbit: Japanese communications
Kosmos 968	1977 119A	USSR	Dec 16	Plesetsk	C-1	750	100.6	772	801	74.0	In orbit
Kosmos 969	1977 120A	USSR	Dec 20	Plesetsk	A-2	5,700	89.0	166	306	62.8	Reentered 1/3/78

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 970	1977 121A	USSR	Dec 21	Tyuratam	F-1-m	2,000	105.7	916	1,127	65.9	In orbit. ASAT warhead, 60 pieces
Kosmos 971	1977 122A	USSR	Dec 23	Plesetsk	C-1	810	104.9	973	1,005	82.9	In orbit
Kosmos 972	1977 123A	USSR	Dec 27	Plesetsk	F-2	5,000	103.8	711	1,163	75.8	In orbit
Kosmos 973	1977 124A	USSR	Dec 27	Tyuratam	A-2	5,700	89.8	202	323	71.4	Reentered 1/9/78
Kosmos 974	1978 1A	USSR	Jan 6	Plesetsk	A-2	6,000	89.8	179	347	62.8	Reentered 1/19/78: reconnaissance
Intelsat IVA F-3	1978 2A	ITSO	Jan 7	ETR	Atlas-Centaur	1,511	1,436.1	35,790	35,783	1.0	In orbit: commerical communications
Soyuz 27	1978 3A	USSR	Jan 10	Tyuratam	A-2	6,570	91.4	334	353	51.6	Returned 3/16/78 with Soyuz 26 crew. Vladimir Dzhanibekov, Oleg Makarov are 2nd crew to dock with Salyut 6. They return aboard Soyuz 26. 1st Soyuz swap
Kosmos 975	1978 4A	USSR	Jan 10	Plesetsk	A-1	4,000	96.9	601	617	81.2	In orbit: electronic ferret
Kosmos 976	1978 5A	USSR	Jan 10	Plesetsk	C-1	40	115.1	1,454	1,461	74.0	In orbit: military commsat
Kosmos 977	1978 5B	USSR	Jan 10	Plesetsk	C-1	40	114.4	1,398	1,461	74.0	In orbit: military commsat
Kosmos 978	1978 5C	USSR	Jan 10	Plesetsk	C-1	40	114.7	1,417	1,461	74.0	In orbit: military commsat
Kosmos 979	1978 5D	USSR	Jan 10	Plesetsk	C-1	40	114.9	1,436	1,461	74.0	In orbit: military commsat
Kosmos 980	1978 5E	USSR	Jan 10	Plesetsk	C-1	40	115.3	1,461	1,474	74.0	In orbit: military commsat
Kosmos 981	1978 5F	USSR	Jan 10	Plesetsk	C-1	40	115.5	1,461	1,494	74.0	In orbit: military commsat
Kosmos 982	1978 5G	USSR	Jan 10	Plesetsk	C-1	40	115.7	1,461	1,514	74.0	In orbit: military commsat
Kosmos 983	1978 5H	USSR	Jan 10	Plesetsk	C-1	40	116.0	1,461	1,536	74.0	In orbit: military commsat
Kosmos 984	1978 6A	USSR	Jan 13	Plesetsk	A-2	5,500	89.5	204	293	62.8	Reentered 1/26/78: reconnaissance
Kosmos 985	1978 7A	USSR	Jan 17	Plesetsk	C-1	810	104.6	939	1,015	82.9	In orbit: navigation
Progress 1	1978 8A	USSR	Jan 20	Tyuratam	A-2	7,020	88.8	179	249	51.6	Reentered 2/8/78: supply craft to Salyut 6
Molniya 3-9	1978 9A	USSR	Jan 24	Plesetsk	A-2-e	2,060	717.7	1,267	39,084	64.8	In orbit: domestic communications
Kosmos 986	1978 10A	USSR	Jan 24	Tyuratam	A-2	6,000	89.4	172	317	65.0	Reentered 2/7/78: reconnaissance

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
China 8	1978 11A	PRC	Jan 26	Shuang Cheng Tzu	CZ-2	2,500	90.9	161	479	57.0	Reentered 2/7/78: reconnaissance. Capsule returned 1/30
IUE	1978 12A	US	Jan 26	ETR	Delta	672	1,436.4	28,082	43,503	30.3	In orbit: International Ultraviolet Explorer carrying 45-cm telescope
Kosmos 987	1978 13A	USSR	Jan 31	Plesetsk	A-2	6,000	89.8	174	351	62.8	Reentered 2/14/78: reconnaissance
Kyokko	1978 14A	Japan	Feb 4	Kagoshima	Mu 3H	103	134.1	636	3,967	65.4	In orbit: scientific; investigating aurorae
Kosmos 988	1978 15A	USSR	Feb 8	Plesetsk	A-2	5,500	90.7	204	408	72.8	Reentered 2/20/78: reconnaissance
FltSatCom 1	1978 16A	US	Feb 9	ETR	Atlas-Centaur	1,884	1,436.2	35,783	35,794	5.1	In orbit: military Fleet Satellite Communications
Kosmos 989	1978 17A	USSR	Feb 14	Tyuratam	A-2	6,000	89.5	169	333	65.1	Reentered 2/28/78: reconnaissance
UME 2	1978 18A	Japan	Feb 16	Tanega-shima	N-1	140	107.2	974	1,217	69.4	In orbit: ionospheric sounding
Kosmos 990	1978 19A	USSR	Feb 17	Plesetsk	C-1	950	100.6	772	800	74.0	In orbit: military communications
NDS 1	1978 20A	US	Feb 22	WTR	Atlas F	450	718.0	19,959	20,403	63.3	In orbit: Navigational Development Satellite (Navstar 1)
None	1978 21A	US	Feb 25	WTR	Titan IIIB-Agena D	700	Current elements not maintained				In orbit
Kosmos 991	1978 22A	USSR	Feb 28	Plesetsk	C-1	810	104.7	951	1,006	83.0	In orbit: navigation
Soyuz 28	1978 23A	USSR	Mar 2	Tyuratam	A-2	6,570	89.5	179	325	51.6	Returned 3/10/78: carried Alexei Gubarev, Vladimir Remek to Salyut 6. Remek is 1st Czechoslovakian in space
Molniya 1-39	1978 24A	USSR	Mar 2	Plesetsk	A-2-e	1,970	717.7	691	39,658	63.8	In orbit: domestic communications
Kosmos 992	1978 25A	USSR	Mar 4	Tyuratam	A-2	5,500	89.5	211	284	71.3	Reentered 3/17/78: reconnaissance
Landsat 3	1978 26A	US	Mar 5	WTR	Delta	960	103.2	897	919	98.8	In orbit: 3rd operational U.S. earth resources survey. Last stage later exploded, 172 pieces
Amsat-Oscar-8	1978 26B	US	Mar 5	WTR	Delta	27	103.1	897	909	98.8	In orbit: radio satellite for use by radio amateurs
PIX	1978 26C	US	Mar 5	WTR	Delta	350	99.0	906	913	103.2	In orbit. Plasma Interaction Experiment
Kosmos 993	1978 27A	USSR	Mar 10	Plesetsk	A-2	6,000	89.6	170	342	72.9	Reentered 3/23/78: reconnaissance
Kosmos 994	1978 28A	USSR	Mar 15	Plesetsk	C-1	920	104.9	971	1,008	82.9	In orbit: navigation

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1978 29A	US	Mar 16	ETR	Titan IIID	13,300	88.5	160	240	96.4	Reentered 9/11/78
None	1978 29B	US	Mar 16	ETR	Titan IIID	60	Elements not available				In orbit
Kosmos 995	1978 30A	USSR	Mar 17	Plesetsk	A-2	5,500	89.0	215	235	81.3	Reentered 3/30/78: reconnaissance
DSCS II C9		US	Mar 25	ETR	Titan IIIC	550	–	–	–	–	Destroyed by range safety
DSCS II C10		US	Mar 25	ETR	Titan IIIC	550	–	–	–	–	Destroyed by range safety
Kosmos 996	1978 31A	USSR	Mar 28	Plesetsk	C-1	810	104.7	949	1,007	82.9	In orbit: navigation
Kosmos 997	1978 32A	USSR	Mar 30	Tyuratam	D-1	700	88.4	230	200	51.6	Reentered 3/30/78: possible manned precursor
Kosmos 998	1978 32B	USSR	Mar 30	Tyuratam	D-1	7,000	88.4	230	200	51.6	Reentered 3/30/78: possible manned precursor
Kosmos 999	1978 33A	USSR	Mar 30	Tyuratam	A-2	6,000	89.7	170	348	71.4	Reentered 4/12/78: reconnaissance
Kosmos 1000	1978 34A	USSR	Mar 31	Plesetsk	C-1	810	104.7	956	1,008	82.9	In orbit: navigation
Intelsat VIA F-6	1978 35A	ITSO	Mar 31	ETR	Atlas-Centaur	825.5	1,436.1	35,769	35,860	1.7	In orbit: commercial communications
Kosmos 1001	1978 36A	USSR	Apr 4	Tyuratam	A-2	7,000	88.8	200	228	51.6	Reentered 4/15/78: manned precursor
Kosmos 1002	1978 37A	USSR	Apr 6	Tyuratam	A-2	5,500	89.4	206	284	65.1	Reentered 4/19/78: reconnaissance
None	1978 38A	US	Apr 7	ETR	Atlas-Agena D	700	Current elements not maintained				In orbit
YURI	1978 39A	Japan	Apr 7	ETR	Delta	678	1,433.7	33,775	37,702	4.5	In orbit: experimental broadcast communications
Kosmos 1003	1978 40A	USSR	Apr 20	Plesetsk	A-2	6,000	89.4	178	328	62.8	Reentered 5/4/78: reconnaissance
HCMM	1978 41A	US	Apr 26	WTR	Scout	134	97.1	618	627	97.6	Decayed 12/22/81: heat capacity mapping mission to produce thermal maps of atmosphere
DMSP-F3	1978 42A	US	May 1	WTR	Thor-Burner II	513	101.1	804	817	98.6	In orbit: weather
Kosmos 1004	1978 43A	USSR	May 5	Plesetsk	A-2	5,500	89.4	205	289	62.8	Reentered 5/18/78: reconnaissance
OTS-2	1978 44A	ESA	May 11	ETR	Delta	865	1,436.3	35,780	35,801	3.1	In orbit: replacement for OTS-A which exploded at launch; communications (Orbital Test Satellite)
Kosmos 1005	1978 45A	USSR	May 12	Plesetsk	A-1	4,000	96.5	577	599	81.2	In orbit: elint ferret

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1006	1978 46A	USSR	May 12	Plesetsk	C-1	1,120	91.1	322	342	65.8	Decayed 3/14/79: radar calibration
NDS 2	1978 47A	US	May 13	WTR	Atlas F	453	718.0	19,851	20,512	64.6	In orbit: US navigation (Navstar 2)
Kosmos 1007	1978 48A	USSR	May 16	Plesetsk	A-2	6,000	89.7	168	350	72.8	Reentered 5/29/78: reconnaissance
Kosmos 1008	1978 49A	USSR	May 17	Plesetsk	C-1	1,080	89.6	248	259	74.0	Decayed 1/8/81: elint ferret
Kosmos 1009	1978 50A	USSR	May 19	Tyuratam	F-1-m	2,500	108.9	964	1,384	65.8	Reentered 5/19/78: interception test; target, Kosmos 967
Pioneer 12	1978 51A	US	May 20	ETR	Atlas-Centaur	582	Trans-Venus trajectory				In orbit: 1st of a pair of Venus-bound craft. Successfully placed in Venus orbit. "Venus orbiter"
Kosmos 1010	1978 52A	USSR	May 23	Plesetsk	A-2	6,000	88.9	215	229	81.4	Reentered 6/5/78: reconnaissance
Kosmos 1011	1978 53A	USSR	May 23	Plesetsk	C-1	810	104.7	956	1,008	82.9	In orbit: navigation
Kosmos 1012	1978 54A	USSR	May 25	Plesetsk	A-2	5,500	89.3	196	288	62.8	Reentered 6/7/78: reconnaissance
Ekran	None	USSR	May 27	Tyuratam	D-1-e	–	–	–	–	–	1st stage failure
Molniya 1-40	1978 55A	USSR	Jun 2	Plesetsk	A-2	1,970	718.0	917	39,446	64.0	In orbit: domestic communications
Kosmos 1013	1978 56A	USSR	Jun 7	Plesetsk	C-1	40	116.3	1,476	1,552	74.0	In orbit: military commsat
Kosmos 1014	1978 56B	USSR	Jun 7	Plesetsk	C-1	40	116.1	1,477	1,529	74.0	In orbit: military commsat
Kosmos 1015	1978 56C	USSR	Jun 7	Plesetsk	C-1	40	115.8	1,472	1,514	74.0	In orbit: military commsat
Kosmos 1016	1978 56D	USSR	Jun 7	Plesetsk	C-1	40	115.6	1,470	1,495	74.0	In orbit: military commsat
Kosmos 1017	1978 56E	USSR	Jun 7	Plesetsk	C-1	40	115.4	1,457	1,489	74.0	In orbit: military commsat
Kosmos 1018	1978 56F	USSR	Jun 7	Plesetsk	C-1	40	115.2	1,441	1,486	74.0	In orbit: military commsat
Kosmos 1019	1978 56G	USSR	Jun 7	Plesetsk	C-1	40	115.0	1,422	1,486	74.0	In orbit: military commsat
Kosmos 1020	1978 56H	USSR	Jun 7	Plesetsk	C-1	40	114.8	1,405	1,483	74.0	In orbit: military commsat
Kosmos 1021	1978 57A	USSR	Jun 10	Plesetsk	A-2	6,000	89.4	172	316	65.0	Reentered 6/23/78: reconnaissance
None	1978 58A	US	Jun 10	ETR	Titan IIIC	820	Current elements not maintained				In orbit
Kosmos 1022	1978 69A	USSR	Jun 12	Plesetsk	A-2	6,000	89.7	169	348	72.9	Reentered 6/25/78: reconnaissance
None	1978 60A	US	Jun 14	WTR	Titan IIID	13,000	91.5	262	440	96.9	Reentered 8/23/81
Soyuz 29	1978 61A	USSR	Jun 15	Tyuratam	A-2	6,570	91.0	316	335	51.6	Returned 9/3/78: Vladimir Kovalyonok, Alexander Ivanchenkov docked with Salyut 6. Mission duration 139 days, 14 hrs, 48 mn

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
GOES 3	1978 62A	US	Jun 16	ETR	Delta	627	1,436.2	35,781	35,795	3.7	In orbit: 3rd geosynchronous weather satellite operated by NOAA
Kosmos 1023	1978 63A	USSR	Jun 21	Plesetsk	C-1	1,000	100.6	773	797	74.1	In orbit: military communications
SEASAT 1	1978 64A	US	Jun 27	WTR	Atlas-Agena D	2,300	100.5	778	783	108.0	In orbit: experimental ocean survey. Died 10/9. Pieces broke off in 1983, 1985
Soyuz 30	1978 65A	USSR	Jun 27	Tyuratam	A-2	6,570	91.2	344	335	51.6	Returned 7/5/78: carried visiting cosmonauts Pyotr Klimuk, Miroslaw Hermaszewski to Salyut 6. 7 days, 22 hrs, 4 mn
Kosmos 1024	1978 66A	USSR	*Jun 28	Plesetsk	A-2-e	2,030	717.5	4,229	36,112	68.1	In orbit: early warning
Kosmos 1025	1978 67A	USSR	Jun 28	Plesetsk	F-2	4,375	97.0	603	626	82.5	In orbit: possible ocean surveillance related
Comstar 3	1978 68A	US	Jun 29	ETR	Atlas-Centaur	1,520	1,445.5	35,867	36,034	0.7	In orbit: U.S. domestic telephone communications
Kosmos 1026	1978 69A	USSR	Jul 2	Tyuratam	A-2	5,500	89.1	207	248	51.8	Reentered 7/6/78: reconnaissance
Progress 2	1978 70A	USSR	Jul 7	Tyuratam	A-2	7,020	88.7	182	234	51.6	Reentered 8/4/78: supply craft to Salyut 6
GEOS 2	1978 71A	ESA	Jul 14	ETR	Delta	573	1,449.0	36,014	36,063	6.0	In orbit: magnetospheric research
Molniya 1-41	1978 72A	USSR	Jul 14	Plesetsk	A-2-e	1,970	717.9	787	39,571	64.6	In orbit: domestic communications
Raduga 4	1978 73A	USSR	Jul 18	Tyuratam	D-1-e	4,000	1,478	35,590	36,590	0.5*	In orbit: communications; Statsionar 2
Kosmos 1027	1978 74A	USSR	Jul 27	Plesetsk	C-1	920	104.7	958	1,000	82.9	In orbit: navigation
None	1978 75A	US	Aug 5	WTR	Titan IIIB-Agena D	700	Elements not available				In orbit: military communications
Kosmos 1028	1978 76A	USSR	Aug 5	Plesetsk	A-2	6,700	89.9	158	383	67.1	Reentered 9/4/78: reconnaissance
Progress 3	1978 77A	USSR	Aug 7	Tyuratam	A-2	7,000	88.7	190	232	51.6	Reentered 8/23/78: supply craft to Salyut 6
Pioneer 13	1978 78A	US	Aug 8	ETR	Atlas-Centaur	904	Trans-Venus Trajectory				Decayed 12/9/78: 2nd in a pair of spacecraft to Venus. Five payloads struck Venus as planned 12/9/78. "Multiprobe"
ISEE 3	1978 79A	US	Aug 12	ETR	Delta	479	3,755.0	705,638	878,448	21.7	In orbit: 3rd of three spacecraft measuring interaction between solar wind and earth: renamed International Cometary Explorer; sent on trajectory to meet Comet Giacobini-Zinner. Rendezvoused 9/11/85

*Initial elements

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Ekran	None	USSR	Aug 17	Tyuratam	D-1-e						2nd stage failure
Molniya 1-42	1978 80A	USSR	Aug 22	Plesetsk	A-2-e	1,970	717.8	1,184	38,472	64.0	In orbit: domestic communications
Soyuz 31	1978 81A	USSR	Aug 26	Tyuratam	A-2	6,600	91.4	337	353	51.6	Returned 11/2/78: carried Valeri Bykovsky, Sigmund Jahn to Salyut 6. 7 days, 20 hrs, 49 mn
Kosmos 1029	1978 82A	USSR	Aug 29	Plesetsk	A-2	6,000	89.3	171	310	62.8	Reentered 9/8/78: reconnaissance
Kosmos 1030	1978 83A	USSR	Sep 6	Plesetsk	A-2-e	2,030	718.0	3,626	36,740	67.1	In orbit: early warning. Exploded 10/10/78, 7 pieces
Venera 11	1978 84A	USSR	Sep 9	Tyuratam	D-1-e	4,940		Heliocentric Orbit			In orbit: Venus exploration craft. Landed on Venus 12/25/78
Kosmos 1031	1978 85A	USSR	Sep 9	Plesetsk	A-2	6,000	89.5	182	347	62.8	Reentered 9/22/78: reconnaissance
Venera 12	1978 86A	USSR	Sep 14	Tyuratam	D-1-e	4,940		Heliocentric Orbit			In orbit: 2nd Venus exploration craft. Landed on Venus 12/21/78
Jiki'ken	1978 87A	Japan	Sep 16	Kagoshima	Mu 3H	100	420.0	277	24,122	31.2	In orbit: Japanese research
Kosmos 1032	1978 88A	USSR	Sep 19	Plesetsk	A-2	5,500	88.9	215	226	81.3	Reentered 10/2/78: reconnaissance
Kosmos 1033	1978 89A	USSR	Oct 3	Plesetsk	A-2	6,000	88.9	204	234	81.4	Reentered 10/16/78: reconnaissance
Progress 4	1978 90A	USSR	Oct 3	Tyuratam	A-2	7,020	88.8	185	248	51.6	Reentered 10/26/78: supply craft to Salyut 6
Kosmos 1034	1978 91A	USSR	Oct 4	Plesetsk	C-1	40	114.9	1,420	1,480	74.0	In orbit: military commsat
Kosmos 1035	1978 91B	USSR	Oct 4	Plesetsk	C-1	40	114.7	1,401	1,477	74.0	In orbit: military commsat
Kosmos 1036	1978 91C	USSR	Oct 4	Plesetsk	C-1	40	115.1	1,440	1,479	74.0	In orbit: military commsat
Kosmos 1037	1978 91D	USSR	Oct 4	Plesetsk	C-1	40	115.3	1,459	1,480	74.0	In orbit: military commsat
Kosmos 1038	1978 91E	USSR	Oct 4	Plesetsk	C-1	40	115.6	1,474	1,486	74.0	In orbit: military commsat
Kosmos 1039	1978 91F	USSR	Oct 4	Plesetsk	C 1	40	116.3	1,477	1,550	74.0	In orbit: military commsat
Kosmos 1040	1978 91G	USSR	Oct 4	Plesetsk	C-1	40	116.0	1,477	1,525	74.0	In orbit: military commsat
Kosmos 1041	1978 91H	USSR	Oct 4	Plesetsk	C-1	40	115.8	1,475	1,507	74.0	In orbit: military commsat
Kosmos 1042	1978 92A	USSR	Oct 6	Plesetsk	A-2	6,000	89.4	180	306	62.8	Reentered 10/19/78: reconnaissance
GPS 3	1978 93A	US	Oct 7	WTR	Atlas F	450	718.0	20,071	20,293	64.2	In orbit: 3rd Global Positioning Satellite (Navstar 3)
Kosmos 1043	1978 94A	USSR	Oct 10	Plesetsk	A-1	4,000	96.2	571	584	81.2	In orbit: electronic ferret
Molniya 3-10	1978 95A	USSR	Oct 13	Plesetsk	A-2-e	2,060	717.9	747	39,613	64.0	In orbit: domestic communications

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Tiros-N	1978 96A	US	Oct 13	WTR	Atlas F	734	101.8	835	853	99.0	In orbit: weather
Kosmos 1044	1978 97A	USSR	Oct 17	Plesetsk	A-2	5,500	89.5	205	292	62.8	Reentered 10/30/78: reconnaissance
Ekran	None	USSR	Oct 17	Tyuratam	D-1-e	–	–	–	–	–	2nd stage failure
Nimbus 7	1978 98A	US	Oct 24	WTR	Delta	907	104.1	944	958	99.3	In orbit: environmental research
Cameo	1978 98B	US	Oct 24	WTR	Delta	350	104.0	927	969	99.4	In orbit: released barium cloud
Interkosmos 18	1978 99A	USSR	Oct 24	Plesetsk	C-1	1,050	92.0	320	428	82.9	Decayed 3/17/81: scientific
Magion	1978 99C	Czech	Oct 24	Plesetsk	C-1	15	93.5	356	534	82.9	Decayed 9/11/81: magnetosphere-ionospheric studies
Kosmos 1045	1978 100A	USSR	Oct 26	Plesetsk	F-2	2,670	120.3	1,682	1,703	82.5	In orbit: probable oceanographic
Radio 1	1978 100B	USSR	Oct 26	Plesetsk	F-2	40	120.3	1,683	1,705	82.6	In orbit: amateur radio
Radio 2	1978 100C	USSR	Oct 26	Plesetsk	F-2	40	120.3	1,683	1,704	82.5	In orbit: amateur radio
Prognos 7	1978 101A	USSR	Oct 30	Tyuratam	A-2-e	950	5,888	472	202,627	64.9	Decayed 10/22/80: scientific; studying magnetosphere
Kosmos 1046	1978 102A	USSR	Nov 1	Plesetsk	A-2	5,500	89.6	200	318	72.8	Reentered 11/13/78: reconnaissance
HEAO 2	1978 103A	US	Nov 13	ETR	Atlas-Centaur	3,150	91.7	355	364	23.5	Decayed 3/25/82: 2nd in a series of three High Energy Astronomy Observatories
Kosmos 1047	1978 104A	USSR	Nov 15	Plesetsk	A-2	6,000	89.7	169	352	72.8	Reentered 11/28/78: reconnaissance
Kosmos 1048	1978 105A	USSR	Nov 16	Plesetsk	C-1	1,000	100.7	776	806	74.0	In orbit: military communications
NATO III-C	1978 106A	NATO	Nov 19	ETR	Delta	720	1,436.1	35,782	35,792	3.2	In orbit: 3rd and final NATO satellite
Kosmos 1049	1978 107A	USSR	Nov 21	Plesetsk	A-2	6,000	89.6	169	341	72.9	Reentered 12/4/78: reconnaissance
Kosmos 1050	1978 108A	USSR	Nov 28	Plesetsk	A-2	6,000	89.7	254	269	62.8	Reentered 12/12/78: reconnaissance
Kosmos 1051	1978 109A	USSR	Dec 5	Plesetsk	C-1	40	114.6	1,392	1,485	74.0	In orbit: military commsat
Kosmos 1052	1978 109B	USSR	Dec 5	Plesetsk	C-1	40	114.8	1,408	1,487	74.0	In orbit: military commsat
Kosmos 1053	1978 109C	USSR	Dec 5	Plesetsk	C-1	40	115.0	1,427	1,487	74.0	In orbit: military commsat
Kosmos 1054	1978 109D	USSR	Dec 5	Plesetsk	C-1	40	115.2	1,444	1,488	74.0	In orbit: military commsat
Kosmos 1055	1978 109E	USSR	Dec 5	Plesetsk	C-1	40	115.5	1,462	1,489	74.0	In orbit: military commsat
Kosmos 1056	1978 109F	USSR	Dec 5	Plesetsk	C-1	40	115.7	1,470	1,501	74.0	In orbit: military commsat
Kosmos 1057	1978 109G	USSR	Dec 5	Plesetsk	C-1	40	115.9	1,479	1,513	74.0	In orbit: military commsat

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1058	1978 109H	USSR	Dec 5	Plesetsk	C-1	40	116.2	1,479	1,535	74.0	In orbit: military communications
Kosmos 1059	1978 110A	USSR	Dec 7	Plesetsk	A-2	6,000	89.7	179	337	62.8	Reentered 12/20/78: reconnaissance
Kosmos 1060	1978 111A	USSR	Dec 8	Tyuratam	A-2	5,500	89.5	204	291	65.0	Reentered 12/21/78: reconnaissance satellite
GPS-4	1978 112A	US	Dec 11	WTR	Atlas F	450	718.0	20,050	20,315	63.3	In orbit: 4th in U.S. Global Positioning System (Navstar 4)
DSCS II-C11	1978 113A	US	Dec 14	ETR	Titan IIIC	550	1,436.0	35,779	35,792	4.7	In orbit: military communications
DSCS II-C12	1978 113B	US	Dec 14	ETR	Titan IIIC	550	1,436.4	35,789	35,794	4.6	In orbit: military communications
Kosmos 1061	1978 114A	USSR	Dec 14	Plesetsk	A-2	5,500	89.4	199	291	62.8	Reentered 12/27/78: reconnaissance
Kosmos 1062	1978 115A	USSR	Dec 15	Plesetsk	C-1	810	92.4	380	401	74.0	Decayed 4/20/81: elint ferret
Anik B1	1978 116A	Canada	Dec 16	ETR	Delta	900	1,442.7	35,895	35,935	0.3	In orbit: domestic communications
Kosmos 1063	1978 117A	USSR	Dec 19	Plesetsk	A-1	4,000	96.8	589	594	81.2	In orbit: elint ferret
Gorizont 1	1978 118A	USSR	Dec 19	Tyuratam	D-1-e	4,000	1,436.6	20,625	50,969	14.3	In orbit: communications for telephone & TV
Kosmos 1064	1978 119A	USSR	Dec 20	Plesetsk	C-1	1,025	94.9	382	649	82.9	In orbit: navigation; probable failure
Kosmos 1065	1978 120A	USSR	Dec 22	Kapustin Yar	C-1	1,170	93.4	344	543	50.6	Decayed 8/1/79: radar calibration
Kosmos 1066	1978 121A	USSR	Dec 23	Plesetsk	A-1	3,800	102.1	822	896	81.2	In orbit: weather; probable failure
Kosmos 1067	1978 122A	USSR	Dec 26	Plesetsk	C-1	880	109.1	1,154	1,211	83.0	In orbit: geodetic
Kosmos 1068	1978 123A	USSR	Dec 26	Plesetsk	A-2	6,000	89.3	168	319	62.7	Reentered 1/8/79: reconnaissance
Kosmos 1069	1978 124A	USSR	Dec 28	Plesetsk	A-2	5,500	89.6	239	278	62.8	Reentered 1/10/79: reconnaissance
Kosmos 1070	1979 1A	USSR	Jan 11	Plesetsk	A-2	5,500	89.2	204	266	62.8	Reentered 1/20/79: reconnaissance
Kosmos 1071	1979 2A	USSR	Jan 13	Plesetsk	A-2	6,000	89.7	178	337	62.8	Reentered 1/26/79: reconnaissance
Kosmos 1072	1979 3A	USSR	Jan 16	Plesetsk	C-1	810	104.8	960	1,013	82.9	In orbit: navigation
Molniya 3-11	1979 4A	USSR	Jan 18	Plesetsk	A-2-e	2,060	717.6	1,496	38,848	64.1	In orbit: domestic communications
Meteor 1-29	1979 5A	USSR	Jan 25	Tyuratam	A-1	3,800	97.0	581	645	97.6	In orbit: weather; sun-synchronous orbit
Kosmos 1073	1979 6A	USSR	Jan 30	Plesetsk	A-2	6,000	89.6	181	326	62.8	Reentered 2/12/79: reconnaissance
Scatha	1979 7A	US	Jan 30	ETR	Delta	360	1,416.0	28,205	42,577	4.9	In orbit: joint DoD-NASA technology experiments
Kosmos 1074	1979 8A	USSR	Jan 31	Tyuratam	A-2	7,000	91.8	354	370	51.6	Reentered 4/1/79: manned precursor

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
ECS (Ayame)	1979 9A	Japan	Feb 6	Tanegashima	N-1	260	1,314.5	29,194	37,548	0.7	In orbit: Experimental Communications Satellite
Kosmos 1075	1979 10A	USSR	Feb 8	Plesetsk	C-1	1,080	92.8	393	430	65.8	Decayed 10/19/81: radar calibration
Kosmos 1076	1979 11A	USSR	Feb 12	Plesetsk	F-2	4,500	96.8	593	620	82.5	In orbit: environmental; studying oceans and associated physical properties
Kosmos 1077	1979 12A	USSR	Feb 13	Plesetsk	A-1	4,000	96.4	580	590	81.2	In orbit: elint ferret
Sage	1979 13A	US	Feb 18	Wallops Islanú	Scout	147	94.4	460	521	55.0	In orbit: designed to study dust & liquid droplets in upper atmosphere by measuring their filtering effect on sunlight
Hakucho	1979 14A	Japan	Feb 21	Kagoshima	Mu-3C	100	94.3	473	494	29.9	Decayed 4/15/85: scientific; studied soft X-ray region of the spectrum
Ekran 3	1979 15A	USSR	Feb 21	Tyuratam	D-1-e	4,000	1,435.5	35,624	35,924	6.2	In orbit: TV relay; Statsionar 1
Kosmos 1078	1979 16A	USSR	Feb 22	Plesetsk	A-2	6,000	88.4	168	280	72.9	Reentered 3/2/79: reconnaissance
Solwind P78-1	1979 17A	US	Feb 24	WTR	Atlas	1,331	95.2	513	547	97.8	In orbit: research; (ionosphere & magnetosphere). Hit by USAF ASAT 9/13/85, 63 pieces
Soyuz 32	1979 18A	USSR	Feb 25	Tyuratam	A-2	6,600	90.7	298	326	51.6	Returned 6/13/79: ferried Vladimir Lyakhov, Valeri Ryumin to Salyut 6. 175 days, 36 mn
Kosmos 1079	1979 19A	USSR	Feb 27	Plesetak	A-2	6,700	89.2	174	337	67.1	Reentered 3/11/79: reconnaissance
Interkosmos 19	1979 20A	USSR	Feb 27	Plesetsk	C-1	1,015	98.3	483	874	74.0	In orbit: scientific
Meteor 2-4	1979 21A	USSR	Mar 1	Plesetsk	A-1	3,800	102.1	845	872	81.2	In orbit: weather
Progress 5	1979 22A	USSR	Mar 12	Tyuratam	A-2	7,020	88.8	183	256	51.6	Reentered 4/5/79: supply craft to Salyut 6
Kosmos 1080	1979 23A	USSR	Mar 14	Plesetsk	A-2	6,000	89.0	168	283	72.8	Reentered 3/28/79: reconnaissance
Kosmos 1081	1979 24A	USSR	Mar 15	Plesetsk	C-1	40	114.5	1,401	1,464	75.0	In orbit: military commsat
Kosmos 1082	1979 24B	USSR	Mar 15	Plesetsk	C-1	40	114.7	1,422	1,463	74.0	In orbit: military commsat
Kosmos 1083	1979 24C	USSR	Mar 15	Plesetsk	C-1	40	114.9	1,440	1,464	74.0	In orbit: military commsat
Kosmos 1084	1979 24D	USSR	Mar 15	Plesetsk	C-1	40	115.2	1,461	1,463	74.0	In orbit: military commsat
Kosmos 1085	1979 24E	USSR	Mar 15	Plesetsk	C-1	40	115.6	1,463	1,503	74.0	In orbit: military commsat
Kosmos 1086	1979 24F	USSR	Mar 15	Plesetsk	C-1	40	115.4	1,463	1,481	74.0	In orbit: military commsat

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1087	1979 24G	USSR	Mar 15	Plesetsk	C-1	40	115.8	1,463	1,523	74.0	In orbit: military commsat
Kosmos 1088	1979 24H	USSR	Mar 15	Plesetsk	C-1	40	116.1	1,463	1,546	74.0	In orbit: military commsat
None	1979 25A	US	Mar 16	WTR	Titan IIID	13,300	88.8	170	258	96.4	Reentered 9/22/79
None	1979 25B	US	Mar 16	WTR	Titan IIID	60	Elements not available				In orbit
Kosmos 1089	1979 26A	USSR	Mar 21	Plesetsk	C-1	810	104.8	965	1,000	83.0	In orbit: navigation
Kosmos 1090	1979 27A	USSR	Mar 31	Plesetsk	A-2	5,500	89.8	201	329	72.9	Reentered 4/13/79: reconnaissance
Kosmos 1091	1979 28A	USSR	Apr 7	Plesetsk	C-1	810	104.8	961	1,008	82.9	In orbit: navigation
Soyuz 33	1979 29A	USSR	Apr 10	Tyuratam	A-2	6,000	89.0	194	261	51.6	Returned 4/12/79: Nikolai Rukavishnikov, Georgi Ivanov failed to dock with Salyut 6
Kosmos 1092	1979 30A	USSR	Apr 11	Plesetsk	C-1	810	104.8	960	1,005	82.9	In orbit: navigation
Molniya 1-43	1979 31A	USSR	Apr 12	Plesetsk	A-2-e	1,970	717.6	1,549	38,802	64.9	In orbit: domestic communications
Kosmos 1093	1979 32A	USSR	Apr 14	Plesetsk	A-1	4,000	96.3	575	584	81.2	In orbit: elint ferret
Kosmos 1094	1979 33A	USSR	Apr 18	Tyuratam	F-1-m	4,000	93.3	427	446	65.0	Decayed 11/7/79: ocean reconnaissance. Exploded 9/17/79, 23 pieces.
Kosmos 1095	1979 34A	USSR	Apr 20	Plesetsk	A-2	6,000	92.2	354	419	72.8	Reentered 5/1/79: reconnaissance
Raduga	1979 35A	USSR	Apr 25	Tyuratam	D-1-e	4,000	1,436.3	35,755	35,824	1.7	In orbit: comsat—Statsionar 1
Kosmos 1096	1979 36A	USSR	Apr 25	Tyuratam	F-1-m	4,000	93.2	429	443	65.0	Decayed 11/24/79: ocean reconnaissance
Kosmos 1097	1979 37A	USSR	Apr 27	Plesetsk	A-2	6,700	89.3	171	316	62.7	Reentered 5/27/79: reconnaissance
FltSatCom 2	1979 38A	US	May 4	ETR	Atlas-Centaur	1,884	1,436.1	35,735	35,837	4.7	In orbit: military communications
Progress 6	1979 39A	USSR	May 13	Tyuratam	A-2	7,020	88.9	190	247	51.6	Reentered 6/9/79 unmanned supply craft to Salyut
Kosmos 1098	1979 40A	USSR	May 15	Plesetsk	A-2	6,000	89.8	169	356	72.9	Reentered 5/28/79: reconnaissance
Kosmos 1099	1979 41A	USSR	May 17	Plesetsk	A-2	5,500	89.0	214	244	81.3	Reentered 5/30/79: reconnaissance
Kosmos 1100	1979 42A	USSR	May 22	Tyuratam	D-1	9,000	88.7	193	223	51.6	Reentered 5/23/79: possible manned precursor
Kosmos 1101	1979 42B	USSR	May 22	Tyuratam	D-1	9,000	88.7	193	223	51.6	Reentered 5/23/79
Kosmos 1102	1979 43A	USSR	May 25	Plesetsk	A-2	5,500	89.1	212	251	81.3	Reentered 6/7/79: reconnaissance

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
None	1979 44A	US	May 28	WTR	Titan IIIB-Agena	4,000	88.6	131	285	96.4	Reentered 8/26/79
Kosmos 1103	1979 45A	USSR	May 31	Plesetsk	A-2	6,000	90.1	210	344	62.7	Reentered 6/14/79: reconnaissance
Kosmos 1104	1979 46A	USSR	May 31	Plesetsk	C-1	810	104.7	956	1,005	82.9	In orbit: navigation
UK Ariel 6	1979 47A	UK	Jun 2	WI	Scout D	154	95.6	533	562	55.0	In orbit: scientific
Molniya 3-12	1979 48A	USSR	Jun 5	Plesetsk	A-2-e	2,060	717.9	1,569	38,791	64.1	In orbit: domestic communications
Soyuz 34	1979 49A	USSR	Jun 6	Tyuratam	A-2	6,800	92.5	395	405	51.6	Launched unmanned; returned with Salyut 6 crew 8/19/79
DMSP F-4	1979 50A	US	Jun 6	WTR	Thor-Burner II	513	101.2	806	828	98.7	In orbit: defense meteorology
Bhaskara	1979 51A	India	Jun 7	Kapustin Yar	C-1	441	92.8	407	412	50.7	In orbit: earth resources
Kosmos 1105	1979 52A	USSR	Jun 8	Plesetsk	A-2	5,500	89.1	210	246	81.3	Reentered 6/21/79: reconnaissance
None	1979 53A	US	Jun 10	ETR	Titan IIIC	820	Current elements not maintained				In orbit
Kosmos 1106	1979 54A	USSR	Jun 12	Plesetsk	A-2	5,500	89.0	214	235	81.4	Reentered 6/15/79: reconnaissance
Kosmos 1107	1979 55A	USSR	Jun 15	Plesetsk	A-2	6,000	89.5	197	302	72.9	Recovered 6/29/79: reconnaissance
Kosmos 1108	1979 56A	USSR	Jun 22	Plesetsk	A-2	5,500	89.1	214	245	81.3	Reentered 7/5/79: reconnaissance
NOAA 6	1979 57A	US	Jun 27	WTR	Atlas F	723	101.0	797	813	98.5	In orbit: meteorological
Kosmos 1109	1979 58A	USSR	Jun 27	Plesetsk	A-2-e	2,030	718.5	712	39,679	62.9*	In orbit: early warning. Exploded 9/79, 9 pieces
Progress 7	1979 59A	USSR	Jun 28	Tyuratam	A-2	1,020	92.5	395	405	51.6	Reentered 7/20/79: Salyut 6 supply craft
Kosmos 1110	1979 60A	USSR	Jun 28	Plesetsk	C-1	1,000	100.7	782	804	74.0	In orbit: military communications
Kosmos 1111	1979 61A	USSR	Jun 29	Plesetsk	A-2	6,000	90.8	255	373	62.8	Reentered 7/14/79: reconnaissance
Gorizont 2	1979 62A	USSR	Jul 5	Tyuratam	D-1-e	4,000	1,526.5	37,397	37,680	5.5	In orbit: communications—Statsionar 4
Kosmos 1112	1979 63A	USSR	Jul 6	Kapustin Yar	C-1	1,190	90.6	269	341	50.7	Decayed 1/21/80: radar calibration
Kosmos 1113	1979 64A	USSR	Jul 10	Plesetsk	A-2	6,000	89.4	171	318	65.0	Reentered 7/23/79: reconnaissance
Kosmos 1114	1979 65A	USSR	Jul 11	Plesetsk	C-1	1,080	93.9	452	473	74.0	Decayed 12/26/81: elint ferret

*Initial elements

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1115	1979 66A	USSR	Jul 13	Plesetsk	A-2	5,500	88.8	204	228	81.3	Reentered 7/26/79: reconnaissance
Kosmos 1116	1979 67A	USSR	Jul 20	Plesetsk	A-1	4,000	95.9	541	581	81.2	In orbit: elint ferret
Kosmos 1117	1979 68A	USSR	Jul 25	Plesetsk	A-2	6,000	89.5	177	325	62.8	Reentered 8/7/79: reconnaissance
Kosmos 1118	1979 69A	USSR	Jul 27	Plesetsk	A-2	5,500	88.9	210	237	81.3	Reentered 8/9/79: reconnaissance
China		PRC	Jul 30	Shuang Cheng Tzu	FB-1	3,600	–	–	–	–	Failed to orbit
Molniya 1-44	1979 70A	USSR	Jul 31	Plesetsk	A-2-e	1,970	717.7	1,130	39,219	64.2	In orbit: domestic communications
Kosmos 1119	1979 71A	USSR	Aug 3	Plesetsk	A-2	5,500	89.0	219	231	81.3	Reentered 8/18/79: reconnaissance
Westar 3	1979 72A	US	Aug 10	ETR	Delta	572	1,436.1	35,777	35,794	0.1	In orbit: U.S. communications, owned by Western Union
Rohini	–	India	Aug 10	Sriharikota	SLV-3	30	–	–	–	–	Failed to reach orbit
Kosmos 1120	1979 73A	USSR	Aug 11	Plesetsk	A-2	6,000	89.8	174	353	70.4	Reentered 8/24/79: reconnaissance
Kosmos 1121	1979 74A	USSR	Aug 14	Plesetsk	A-2	6,700	89.6	185	361	67.2	Reentered 9/13/79: reconnaissance
Kosmos 1122	1979 75A	USSR	Aug 17	Plesetsk	A-2	5,500	88.9	208	227	81.3	Reentered 8/30/79: reconnaissance; carried earth resources package
Kosmos 1123	1979 76A	USSR	Aug 21	Plesetsk	A-2	5,500	88.9	211	236	81.3	Reentered 9/3/79: reconnaissance
Kosmos 1124	1979 77A	USSR	Aug 28	Plesetsk	A-2-e	2,030	717.0	3,602	36,715	68.0	In orbit: early warning. Exploded 9/9/79, 8 pieces
Kosmos 1125	1979 78A	USSR	Aug 28	Plesetsk	C-1	1,000	100.8	786	804	74.0	In orbit: military communications
Kosmos 1126	1979 79A	USSR	Aug 31	Plesetsk	A-2	6,000	90.4	194	391	72.8	Reentered 9/14/79: reconnaissance
Kosmos 1127	1979 80A	USSR	Sep 5	Plesetsk	A-2	6,000	89.4	213	271	81.3	Reentered 9/18/79: reconnaissance
Kosmos 1128	1979 81A	USSR	Sep 14	Plesetsk	A-2	6,000	89.6	174	330	62.8	Reentered 9/27/79: reconnaissance
HEAO 3	1979 82A	US	Sep 20	ETR	Atlas-Centaur	3,150	93.4	424	457	43.6	Decayed 12/7/81: final HEAO, measuring cosmic rays, gamma rays
Kosmos 1129	1979 83A	USSR	Sep 25	Plesetsk	A-2	6,000	90.4	213	376	62.8	Reentered 10/14/79: biological, experiments in radiation medicine, development of embryos in zero-g
Kosmos 1130	1979 84A	USSR	Sep 25	Plesetsk	C-1	60	114.6	1,395	1,479	74.0	In orbit: military communications

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1131	1979 84B	USSR	Sep 25	Plesetsk	C-1	40	114.8	1,409	1,481	74.0	In orbit: military communications
Kosmos 1132	1979 84C	USSR	Sep 25	Plesetsk	C-1	40	114.9	1,423	1,480	74.0	In orbit: military communications
Kosmos 1133	1979 84D	USSR	Sep 25	Plesetsk	C-1	40	115.1	1,437	1,481	74.0	In orbit: military communications
Kosmos 1134	1979 84E	USSR	Sep 25	Plesetsk	C-1	40	115.3	1,452	1,481	74.0	In orbit: military communications
Kosmos 1135	1979 84F	USSR	Sep 25	Plesetsk	C-1	40	115.4	1,460	1,490	74.0	In orbit: military communications
Kosmos 1136	1979 84G	USSR	Sep 25	Plesetsk	C-1	40	115.6	1,471	1,494	74.0	In orbit: military communications
Kosmos 1137	1979 84H	USSR	Sep 25	Plesetsk	C-1	40	115.8	1,471	1,512	74.0	In orbit: military communications
Kosmos 1138	1979 85A	USSR	Sep 28	Plesetsk	A-2	6,000	90.1	195	406	72.8	Reentered 10/11/79: reconnaissance
None	1979 86A	US	Oct 1	ETR	Titan IIIC	820	Current elements not maintained				In orbit
Ekran 4	1979 87A	USSR	Oct 3	Tyuratam	D-1-e	4,000	1,436.5	34,778	36,810	1.0	In orbit: domestic TV relay, Statsionar T
Kosmos 1139	1979 88A	USSR	Oct 5	Plesetsk	A-2	5,500	89.8	201	329	72.9	Reentered 10/18/79: reconnaissance
Kosmos 1140	1979 89A	USSR	Oct 11	Plesetsk	C-1	1,000	100.6	773	796	74.1	In orbit: military communications
Kosmos 1141	1979 90A	USSR	Oct 16	Plesetsk	C-1	810	104.6	955	997	83.0	In orbit: navigation
Molniya 1-45	1979 91A	USSR	Oct 20	Plesetsk	A-2-e	1,970	717.9	1,776	38,581	64.7	In orbit: domestic communications
Kosmos 1142	1979 92A	USSR	Oct 22	Plesetsk	A-2	6,000	92.2	349	413	72.9	Reentered 11/4/79: reconnaissance
Kosmos 1143	1979 93A	USSR	Oct 26	Plesetsk	A-1	4,000	97.0	593	611	81.2	In orbit: elint ferret
MAGSAT	1979 94A	US	Oct 30	WTR	Scout G	181	93.1	341	510	96.8	Decayed 6/11/80: NASA scientific; designed to measure the near-earth magnetic field & crustal anomalies
Meteor 2-5	1979 95A	USSR	Oct 31	Plesetsk	A-1	3,800	102.5	866	882	81.2	In orbit: weather
Interkosmos 20	1979 96A	USSR	Nov 1	Plesetsk	C-1	1,100	91.6	343	363	74.0	Decayed 3/5/81: scientific
Kosmos 1144	1979 97A	USSR	Nov 2	Plesetsk	A-2	6,700	89.4	158	337	67.1	Reentered 12/4/79: reconnaissance
DSCS II-D13	1979 98A	US	Nov 21	ETR	Titan IIIC	611.5	1,436.3	35,787	35,791	4.1	In orbit: defense communications
DSCS II-D14	1979 98B	US	Nov 21	ETR	Titan IIIC	611.5	1,436.0	35,778	35,790	4.2	In orbit: defense communications
Kosmos 1145	1979 99A	USSR	Nov 27	Plesetsk	A-1	4,000	96.8	586	594	81.2	In orbit: elint ferret
Kosmos 1146	1979 100A	USSR	Dec 5	Plesetsk	C-1	1,000	92.9	408	428	65.9	Decayed 11/25/81: radar calibration

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
SATCOM 3	1979 101A	US	Dec 7	ETR	Delta	463	788.9	8,289	35,519	10.5	In orbit: communication ceased after firing AKM
Kosmos 1147	1979 102A	USSR	Dec 12	Plesetsk	A-2	6,000	90.3	195	380	72.9	Reentered 12/26/79: reconnaissance
Soyuz T	1979 103A	USSR	Dec 16	Tyuratam	A-2	7,000	92.0	364	376	51.6	Reentered 3/25/80: flown unmanned; new generation manned transport, docked with Salyut 6
CAT	1979 104A	ESA	Dec 24	Kourou	Ariane	1,602	374.9	178	21,510	17.8	In orbit: vehicle test. 3rd stage exploded 3/1/80, 25 pieces in orbit
Gorizont 3	1979 105A	USSR	Dec 28	Tyuratam	D-1-e	4,000	1,435.9	35,772	35,794	5.2	In orbit: communications
Kosmos 1148	1979 106A	USSR	Dec 28	Plesetsk	A-2	6,000	89.5	167	327	67.1	Reentered 1/10/80: reconnaissance
Kosmos 1149	1980 1A	USSR	Jan 9	Plesetsk	A-2	6,300	92.3	353	418	72.9	Reentered 1/23/80: military reconnaissance
Molniya 1-46	1980 2A	USSR	Jan 11	Plesetsk	A-2-e	1,000	717.8	1,429	38,928	64.1	In orbit: domestic communications
Kosmos 1150	1980 3A	USSR	Jan 14	Plesetsk	C-1	810	104.9	963	1,013	83.0	In orbit: navigation
FltSatCom 3	1980 4A	US	Jan 18	ETR	Atlas-Centaur	1,884	1,436.3	35,771	35,810	4.3	In orbit: military communications
Kosmos 1151	1980 5A	USSR	Jan 23	Plesetsk	F-2	6,320	97.2	613	640	82.5	In orbit: ocean survey
Kosmos 1152	1980 6A	USSR	Jan 24	Plesetsk	A-2	6,700	89.4	144	346	67.2	Reentered 2/6/80: military recon/ surveillance
Kosmos 1153	1980 7A	USSR	Jan 25	Plesetsk	C-1	810	104.9	960	1,016	82.9	In orbit: navigation
Kosmos 1154	1980 8A	USSR	Jan 30	Plesetsk	A-1	3,800	97.1	612	624	81.2	In orbit: elint (electronic intelligence)
Kosmos 1155	1980 9A	USSR	Feb 7	Plesetsk	A-2	6,300	92.3	355	414	72.8	Reentered 2/21/80: military recon/ surveillance
None	1980 10A	US	Feb 7	WTR	Titan IIID	13,300	92.5	361	429	96.9	Decayed 10/30/82
GPS (Navstar 5)	1980 11A	US	Feb 9	WTR	Atlas F	433	717.9	19,976	20,386	63.8	In orbit: navigation; part of Global Positioning System
Kosmos 1156	1980 12A	USSR	Feb 11	Plesetsk	C-1	40	114.5	1,396	1,472	74.0	In orbit: Naval communications
Kosmos 1157	1980 12B	USSR	Feb 11	Plesetsk	C-1	40	114.8	1,413	1,475	74.0	In orbit: Naval communications
Kosmos 1158	1980 12C	USSR	Feb 11	Plesetsk	C-1	40	115.0	1,431	1,475	74.0	In orbit: Naval communications
Kosmos 1159	1980 12D	USSR	Feb 11	Plesetsk	C-1	40	115.2	1,448	1,477	74.0	In orbit: Naval communications

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1160	1980 12E	USSR	Feb 11	Plesetsk	C-1	40	115.4	1,463	1,482	74.0	In orbit: Naval communications
Kosmos 1161	1980 12F	USSR	Feb 11	Plesetsk	C-1	40	115.6	1,465	1,502	74.0	In orbit: Naval communications
Kosmos 1162	1980 12G	USSR	Feb 11	Plesetsk	C-1	40	115.8	1,470	1,517	74.0	In orbit: Naval communications
Kosmos 1163	1980 12H	USSR	Feb 11	Plesetsk	C-1	40	116.1	1,469	1,541	74.0	In orbit: Naval communications
Kosmos 1164	1980 13A	USSR	Feb 12	Plesetsk	A-2-e	1,890	92.3	212	570	62.8	Decayed 1/12/81: early warning; possible failure of Molniya communications. Note: strong suspicion that NORAD never found in high orbit listed. Misidentified part of another flight.
SMM	1980 14A	US	Feb 14	ETR	Delta	2,500	94.4	488	493	28.5	In orbit: Solar Maximum Mission; launched by NASA to observe the sun. Scientific; repaired on orbit by STS 41-C crew 4/9/84.
Tansei 4	1980 15A	Japan	Feb 17	Kagoshima	Mu 3S	134	94.3	455	510	38.7	Decayed 5/12/83: scientific
Raduga 6	1980 16A	USSR	Feb 20	Tyuratam	D-1-e	2,500	1,435.9	35,778	35,778	5.4	In orbit: communications
Kosmos 1165	1980 17A	USSR	Feb 21	Plesetsk	A-2	6,300	89.7	170	350	72.8	Reentered 3/5/80: military reconnaissance
Ayame 2	1980 18A	Japan	Feb 22	Tanega-shima	N-1	260	1411.9	33,333	37,289	1.0	In orbit: (ECS-2)
NOSS 3	1980 19A	US	Mar 3	WTR	Atlas F	–	107.4	1,084	1,132	63.5	In orbit
SSU	1980 19C	US	Mar 3	WTR	Atlas F	–	Elements not available				In orbit
SSU	1981 19G	US	Mar 3	WTR	Atlas F	–	Elements not available				In orbit
Kosmos 1166	1980 20A	USSR	Mar 4	Plesetsk	A-2	6,300	92.4	356	430	72.8	Reentered 3/18/80: military recon/surveillance
Kosmos 1167	1980 21A	USSR	Mar 14	Tyuratam	F-1-m	4,150	93.3	425	442	65.0	Decayed 10/1/81: military; EORSAT (elint ocean reconnaissance). Exploded 7/15/81, 13 pieces
Kosmos 1168	1980 22A	USSR	Mar 17	Plesetsk	C-1	810	104.8	958	1,009	82.9	In orbit: navigation
Kosmos 1169	1980 23A	USSR	Mar 27	Plesetsk	C-1	900	93.0	403	435	65.8	Decayed 3/3/83: interception test radar calibration
Progress 8	1980 24A	USSR	Mar 27	Tyuratam	A-2	7,020	90.6	230	242	51.6	Reentered 4/26/80: unmanned supply vehicle to Salyut 6
Kosmos 1170	1980 25A	USSR	Apr 1	Tyuratam	A-2	6,300	89.5	174	336	70.3	Reentered 4/12/80: military recon/surveillance
Kosmos 1171	1980 26A	USSR	Apr 3	Plesetsk	C-1	750	104.8	969	1,002	65.8	In orbit: target for Kosmos 1174
Soyuz 35	1980 27A	USSR	Apr 9	Tyuratam	A-2	6,570	88.8	197	247	51.6	Ferried Leonid Popov, Valeri Ryumin to Salyut 6. Crew returned on Soyuz 37. Soyuz 35 returned Soyuz 36 crew 6/3/80
Kosmos 1172	1980 28A	USSR	Apr 12	Plesetsk	A-2-e	1,800	717.5	3,622	36,718	66.2	In orbit: early warning

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1173	1980 29A	USSR	Apr 17	Tyuratam	A-2	6,300	89.6	155	355	70.3	Reentered 4/28/80: military recon/surveillance
Kosmos 1174	1980 30A	USSR	Apr 18	Tyuratam	F-1-m	3,320	105.0	378	1,559	66.1	In orbit: interception test using Kosmos 1171 as its primary target. 25 pieces in orbit
Kosmos 1175	1980 31A	USSR	Apr 18	Plesetsk	A-2-e	1,890	91.6	252	459	62.8	Decayed 5/28/80: probably failed early warning
GPS 6 (Navstar 6)	1980 32A	US	Apr 26	WTR	Atlas F	450	718.0	19,867	20,497	63.2	In orbit: navigation; (part of Global Positioning System)
Progress 9	1980 33A	USSR	Apr 27	Tyuratam	A-2	7,020	90.4	244	350	51.6	Reentered 5/22/80: unmanned ferry carrying supplies to crew of Salyut 6
Kosmos 1176	1980 34A	USSR	Apr 29	Tyuratam	F-1-m	4,450	103.4	873	964	64.8	In orbit: radar-carrying ocean survey to Kosmos 954 (nuclear)
Kosmos 1177	1980 35A	USSR	Apr 29	Plesetsk	A-2	6,700	89.6	165	341	67.1	Reentered 6/12/80: maneuverable reconnaissance
Kosmos 1178	1980 36A	USSR	May 7	Plesetsk	A-2	6,300	92.2	354	413	72.8	Reentered 5/22/80: military recon/surveillance
Kosmos 1179	1980 37A	USSR	May 14	Plesetsk	C-1	650	96.5	278	906	82.9	In orbit: navigation (failure)
Kosmos 1180	1980 38A	USSR	May 15	Plesetsk	A-2	5,900	89.8	238	290	62.8	Reentered 5/26/80: civil; geophysics
Kosmos 1181	1980 39A	USSR	May 20	Plesetsk	C-1	810	104.8	969	1,004	82.9	In orbit: military; navigation
Kosmos 1182	1980 40A	USSR	May 23	Plesetsk	A-2	7,420	89.1	210	250	62.3	Reentered 6/5/80: military recon/surveillance, also earth resources
Soyuz 36	1980 41A	USSR	May 26	Tyuratam	A-2	6,570	90.1	250	314	51.6	Carried Valeri Kubasov, Bertalan Farkas to Salyut 6. Crew returned on Soyuz 35. Soyuz 36 returned Soyuz 37 crew, 7/30/80
Kosmos 1183	1980 42A	USSR	May 28	Plesetsk	A-2	6,300	92.5	377	418	72.9	Reentered 6/11/80: military recon/surveillance
NOAA B (7)	1980 43A	US	May 29	WTR	Atlas F	1,405	97.5	250	1,028	92.2	Decayed 5/3/81: meteorological; attained unusable orbit
Kosmos 1184	1980 44A	USSR	Jun 4	Plesetsk	A-1	3,800	96.8	613	593	81.2	In orbit: electronic ferret; military (elint)
Soyuz T 2	1980 45A	USSR	Jun 5	Tyuratam	A-2	7,000	90.2	266	315	51.6	Returned 6/9/80: test flight of modified Soyuz; Yuri Malyshev, Vladimir Aksyonov docked with Salyut 6, 6/6
Kosmos 1185	1980 46A	USSR	Jun 6	Plesetsk	A-2	7,420	89.9	259	283	82.4	Reentered 6/20/80: military recon/surveillance, also earth resources

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1186	1980 47A	USSR	Jun 6	Plesetsk	C-1	900	87.1	123	134	74.0	Decayed 1/1/82: radar calibration
Kosmos 1187	1980 48A	USSR	Jun 12	Plesetsk	A-2	6,300	89.7	225	289	72.8	Reentered 6/28/80: military recon/surveillance
Gorizont 4	1980 49A	USSR	Jun 14	Tyuratam	D-1-e	2,880	1,436.2	35,759	35,817	5.0	In orbit: civil communications
Kosmos 1188	1980 50A	USSR	Jun 14	Plesetsk	A-2-e	1,800	718.3	3,303	37,817	67.5	In orbit: early warning
Meteor 1-30	1980 51A	USSR	Jun 18	Tyuratam	A-1	3,475	96.1	540	600	97.7	In orbit: combined meteorological & earth resources
None	1980 52A	US	Jun 18	WTR	Titan IIID	13,300	89.1	227	236	96.4	Decayed 3/6/81
Molniya 1-47	1980 53A	USSR	Jun 21	Plesetsk	A-2-e	1,750	717.7	1,962	38,390	64.8	In orbit: domestic communications
Kosmos 1189	1980 54A	USSR	Jun 26	Plesetsk	A-2	6,300	89.7	225	290	72.8	Reentered 7/10/80: military recon/surveillance
Progress 10	1980 55A	USSR	Jun 29	Tyuratam	A-2	7,020	89.0	206	255	51.6	Reentered 7/19/80: unmanned ferry carrying supplies to Salyut 6
Kosmos 1190	1980 56A	USSR	Jul 1	Plesetsk	C-1	750	100.7	785	800	74.0	In orbit: military store-dump communications
Kosmos 1191	1980 57A	USSR	Jul 2	Plesetsk	A-2-e	1,800	718.4	617	39,773	62.6	In orbit: early warning. Exploded 5/12/81, 5 pieces
Kosmos 1192	1980 58A	USSR	Jul 9	Plesetsk	C-1	40	114.5	1,395	1,471	74.0	In orbit: military communications
Kosmos 1193	1980 58B	USSR	Jul 9	Plesetsk	C-1	40	114.7	1,412	1,473	74.0	In orbit: military communications
Kosmos 1194	1980 58C	USSR	Jul 9	Plesetsk	C-1	40	114.9	1,431	1,472	74.0	In orbit: military communications
Kosmos 1195	1980 58D	USSR	Jul 9	Plesetsk	C-1	40	115.1	1,448	1,475	74.0	In orbit: military communications
Kosmos 1196	1980 58E	USSR	Jul 9	Plesetsk	C-1	40	115.3	1,466	1,473	74.0	In orbit: military communications
Kosmos 1197	1980 58F	USSR	Jul 9	Plesetsk	C-1	40	115.5	1,469	1,490	74.0	In orbit: military communications
Kosmos 1198	1980 58G	USSR	Jul 9	Plesetsk	C-1	40	115.8	1,471	1,507	74.0	In orbit: military communications
Kosmos 1199	1980 58H	USSR	Jul 9	Plesetsk	C-1	40	116.0	1,471	1,529	74.0	In orbit: military communications
Kosmos 1200	1980 59A	USSR	Jul 9	Plesetsk	A-2	6,300	89.7	226	289	72.8	Reentered 7-23-80: military recon/surveillance
DMSP F-5		US	Jul 14	WSMC	Thor						Failed to orbit
Ekran 5	1980 60A	USSR	Jul 15	Tyuratam	D-1-e	2,700	1,438.4	1,953	69,711	9.6	In orbit: domestic TV relay

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1201	1980 61A	USSR	Jul 15	Plesetsk	A-2	5,700	89.1	211	246	82.3	Reentered 7/28/80: military recon/surveillance and earth resources
Rohini 1	1980 62A	India	Jul 18	Srihari-kota	SLV-3	40	95.0	295	745	44.7	Decayed 5/20/81: 1st Indian-built and launched
Molynia 3-13	1980 63A	USSR	Jul 18	Plesetsk	A-2-e	1,890	717.8	1,635	38,718	63.8	In orbit: civil communications
Soyuz 37	1980 64A	USSR	Jul 23	Tyuratam	A-2	6,570	90.0	258	294	51.4	Ferried Viktor Gorbatko, Pham Tuan to Salyut 6. Crew returned on Soyuz 36. Soyuz 37 returned 10/11/80 with Soyuz 35 crew
Kosmos 1202	1980 65A	USSR	Jul 24	Plesetsk	A-2	6,300	89.7	226	289	72.8	Reentered 8/7/80: military recon/surveillance
Kosmos 1203	1980 66A	USSR	Jul 31	Plesetsk	A-2	7,420	89.8	259	273	82.3	Reentered 8/14/80: military recon/surveillance and earth resources
Kosmos 1204	1980 67A	USSR	Jul 31	Kapustin Yar	C-1	900	91.6	296	406	50.7	Decayed 2/23/81: radar calibration
Kosmos 1205	1980 68A	USSR	Aug 12	Plesetsk	A-2	6,300	89.7	225	293	72.8	Reentered 8/26/80: military recon/surveillance
Kosmos 1206	1980 69A	USSR	Aug 15	Plesetsk	A-1	3,800	96.8	601	607	81.2	In orbit: possibly electronic ferret (military)
Kosmos 1207	1980 70A	USSR	Aug 22	Plesetsk	A-2	7,200	89.0	217	228	82.3	Reentered 9/8/80: military recon/surviillance and earth resources
Kosmos 1208	1980 71A	USSR	Aug 26	Plesetsk	A-2	6,700	89.6	171	336	67.1	Reentered 9/24/80: photo/recon
Kosmos 1209	1980 72A	USSR	Sep 3	Plesetsk	A-2	6,300	89.8	259	272	82.3	Reentered 9/17/80: military recon/surveillance and earth resources
Meteor 2 (6)	1980 73A	USSR	Sep 9	Plesetsk	A-1	3,300	102.2	840	889	81.2	In orbit: meteorological
GOES-4	1980 74A	US	Sep 9	ETR	Delta	627	1,436.1	35,771	35,802	3.1	In orbit: weather
Soyuz 38	1980 75A	USSR	Sep 18	Tyuratam	A-2	6,570	89.0	195	256	51.6	Manned ferry to Salyut 6; Yuri Romanenko, Arnaldo Mendez returned 9/26/80 after 7 days, 20 hrs, 43 mn
Kosmos 1210	1980 76A	USSR	Sep 19	Plesetsk	A-2	7,420	88.7	179	243	82.2	Reentered 10/3/80: military recon/surveillance
Kosmos 1211	1980 77A	USSR	Sep 23	Plesetsk	A-2	7,220	89.0	215	240	82.3	Reentered 10/4/80: possibly earth resources
Kosmos 1212	1980 78A	USSR	Sep 26	Plesetsk	A-2	7,220	89.1	208	247	82.3	Reentered 10/9/80: military recon/surveillance and earth resources
Progress 11	1980 79A	USSR	Sep 28	Tyuratam	A-2	7,020	90.7	303	318	51.6	Reentered 12/11/80: resupplied Salyut 6

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1213	1980 80A	USSR	Oct 3	Plesetsk	A-2	6,300	89.6	195	316	72.9	Reentered 10/17/80: military recon/surveillance
Raduga 7	1980 81A	USSR	Oct 5	Tyuratam	D-1-e	2,500	1,436.5	35,789	36,801	5.0	In orbit: Statsionar 3-civil communications; radio & telegraph, centimeter bank, black & white TV, orbital network
Kosmos 1214	1980 82A	USSR	Oct 10	Plesetsk	A-2	5,700	89.6	173	340	67.1	Reentered 10/23/80: military recon
Kosmos 1215	1980 83A	USSR	Oct 14	Plesetsk	C-1	900	93.8	439	477	74.0	Decayed 5/12/83: radar calibration
Kosmos 1216	1980 84A	USSR	Oct 16	Plesetsk	A-2	6,300	90.1	189	367	72.9	Reentered 10/30/80: military recon/surveillance
Kosmos 1217	1980 85A	USSR	Oct 24	Plesetsk	A-2-e	1,800	716.9	3,141	37,167	67.2	In orbit: military; early warning
Kosmos 1218	1980 86A	USSR	Oct 30	Tyuratam	A-2	6,700	89.6	165	341	64.9	Reentered 12/12/80: military recon/surveillance
FltSatCom 4	1980 87A	US	Oct 31	ETR	Atlas-Centaur	1,800	1,436.2	35,765	35,811	4.0	In orbit: military communications
Kosmos 1219	1980 88A	USSR	Oct 31	Plesetsk	A-2	6,300	89.7	225	294	72.8	Reentered 11/13/80: military recon/surveillance
Kosmos 1220	1980 89A	USSR	Nov 4	Tyuratam	F-1-m	4,150	99.1	577	856	65.0	In orbit: ocean surveillance (military) (elint). Exploded 6/20/82, 74 pieces
Kosmos 1221	1980 90A	USSR	Nov 12	Plesetsk	A-2	6,300	90.3	192	386	72.9	Reentered 11/26/80: military recon/surveillance
SBS 1	1980 91A	US	Nov 15	ETR	Delta	550	1,436.1	35,785	35,789	0.7	In orbit: Satellite Business Systems
Molniya 1-48	1980 92A	USSR	Nov 16	Plesetsk	A-2-e	1,750	717.8	2,498	37,854	64.6	In orbit: civil; communications
Kosmos 1222	1980 93A	USSR	Nov 21	Plesetsk	A-1	3,800	96.8	604	609	81.2	In orbit: military; monitor
Soyuz T3	1980 94A	USSR	Nov 27	Tyuratam	A-2	7,000	89.6	255	260	51.6	Maintenance mission to Salyut 6. Leonid Kizim, Oleg Makarov, Gennadi Strekalov returned 12/10/80 after 12 days, 19 hrs, 8 mn
Kosmos 1223	1980 95A	USSR	Nov 27	Plesetsk	A-2-e	1,800	718.2	3,497	36,875	65.6	In orbit: military; early warning
Kosmos 1224	1980 96A	USSR	Dec 1	Plesetsk	A-2	6,300	90.3	197	377	72.9	Reentered 12/15/80: military recon/surveillance
Kosmos 1225	1980 97A	USSR	Dec 5	Plesetsk	C-1	810	104.8	945	1,025	82.9	In orbit: military; navigation
Intelsat V F-2	1980 98A	US	Dec 6	ETR	Atlas-Centaur	2,000	1,436.1	35,765	35,808	0.0	In orbit: largest commercial communications
None		US	Dec 9	WSMC	Atlas F						Failed to orbit

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1226	1980 99A	USSR	Dec 10	Plesetsk	C-1	680	104.8	810	1,009	82.9	In orbit: military; navigation
None	1980 100A	US	Dec 13	WTR	Titan IIIB-Agena	700	Elements not available				In orbit
Kosmos 1227	1980 101A	USSR	Dec 16	Plesetsk	A-2	6,300	89.5	197	298	72.9	Reentered 12/28/80: military recon/surveillance
Kosmos 1228	1980 102A	USSR	Dec 23	Plesetsk	C-1	40	114.4	1,391	1,463	74.0	In orbit: military communications (tactical)
Kosmos 1229	1980 102B	USSR	Dec 23	Plesetsk	C-1	40	114.6	1,412	1,463	74.0	In orbit: military communications (tactical)
Kosmos 1230	1980 102C	USSR	Dec 23	Plesetsk	C-1	40	114.5	1,497	1,463	74.0	In orbit: military communications (tactical)
Kosmos 1231	1980 102D	USSR	Dec 23	Plesetsk	C-1	40	114.5	1,403	1,463	74.0	In orbit: military communications (tactical)
Kosmos 1232	1980 102E	USSR	Dec 23	Plesetsk	C-1	40	114.6	1,410	1,463	74.0	In orbit: military communications (tactical)
Kosmos 1233	1980 102F	USSR	Dec 23	Plesetsk	C-1	40	114.7	1,416	1,463	74.0	In orbit: military communications (tactical)
Kosmos 1234	1980 102G	USSR	Dec 23	Plesetsk	C-1	40	114.6	1,407	1,463	74.0	In orbit: military communications (tactical)
Kosmos 1235	1980 102H	USSR	Dec 23	Plesetsk	C-1	40	114.6	1,411	1,463	74.0	In orbit: military communications (tactical)
Prognoz 8	1980 103A	USSR	Dec 25	Tyuratam	A-2-e	910	5,687.8	978	197,364	65.8	In orbit: civil; research and solar wind interaction with magnetosphere
Ekran 6	1980 104A	USSR	Dec 26	Tyuratam	D-1-e	2,700	1,436.3	35,779	35,827	4.8	In orbit: civil; communications (TV distribution)
Kosmos 1236	1980 105A	USSR	Dec 26	Plesetsk	A-2	6,700	89.8	169	363	67.1	Reentered 1/21/81: military recon/surveillance
Kosmos 1237	1980 1A	USSR	Jan 6	Plesetsk	A-2	600	92.2	355	415	72.9	Reentered 1/21/81: photo reconnaissance
Molniya 3-14	1981 2A	USSR	Jan 9	Plesetsk	A-2-e	1,500	717.7	767	39,585	64.2	In orbit: replaced Molniya 3-10; on station 1/14/81
Kosmos 1238	1981 3A	USSR	Jan 16	Plesetsk	C-1	550	108.0	400	1,866	83.0	In orbit: minor military; paired with Kosmos 1263
Kosmos 1239	1981 4A	USSR	Jan 16	Plesetsk	A-2	5,700	89.0	213	234	82.3	Reentered 1/28/81: photo reconnaissance
Kosmos 1240	1981 5A	USSR	Jan 20	Tyuratam	A-2	6,700	89.7	167	361	64.9	Reentered 2/17/81: photo reconnaissance
Kosmos 1241	1981 6A	USSR	Jan 21	Plesetsk	C-1	–	104.9	975	1,007	65.8	In orbit: ASAT target; intercepted by Kosmos 1234 and 1258
Progress 12	1981 7A	USSR	Jan 24	Tyuratam	A-2	7,020	90.6	294	319	51.6	Reentered 3/20/81: resupply to Salyut 6
Kosmos 1242	1981 8A	USSR	Jan 27	Plesetsk	A-1	2,500	97.1	608	635	81.2	In orbit

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Molniya 1-49	1981 9A	USSR	Jan 30	Plesetsk	A-2-e	1,000	718.3	1,195	39,185	64.1	In orbit: communications; replaced Molniya 1-41; on station 3/13/81
Kosmos 1243	1981 10A	USSR	Feb 2	Tyuratam	F-1-m	–	97.8	296	1,015	65.8	Decayed 2/2/81: ASAT interceptor
Interkosmos 21	1981 11A	USSR	Feb 6	Plesetsk	C-1	550	92.8	397	427	74.0	Decayed 7/7/82: scientific; oceanographic and terrestrial experiments
Kiku 3 (ETS 4)	1981 12A	Japan	Feb 11	Tanega-shima	N-2	640	524.7	276	30,065	28.3	In orbit
Kosmos 1244	1981 13A	USSR	Feb 12	Plesetsk	C-1	810	104.8	959	1,007	83.0	In orbit: navigation; replaced Kosmos 1104
Kosmos 1245	1981 14A	USSR	Feb 13	Plesetsk	A-2	6,300	92.2	346	423	72.8	Reentered 2/27/81: photo reconnaissance
Kosmos 1246	1981 15A	USSR	Feb 18	Tyuratam	A-2	6,700	89.1	197	271	64.9	Reentered 3/13/81: photo reconnaissance
Kosmos 1247	1981 16A	USSR	Feb 19	Plesetsk	A-2-e	1,250	711.1	3,061	36,962	67.5	In orbit: early warning; established 5th plane of EW constellation; on station 2/23. Exploded 10/20/81, 8 pieces
Astro (Hinotori)	1981 17A	Japan	Feb 21	Uchinora	Mu-3	185	96.0	541	592	31.3	In orbit: scientific
Comstar 4	1981 18A	US	Feb 21	ETR	Atlas-Centaur	1520	1,436.2	35,782	35,794	0.8	In orbit: commerical communications for COMSAT Corp.
None	1981 19A	US	Feb 28	WTR	Titan IIIB	3,000	89.3	138	336	96.4	Decayed 6/20/81
Kosmos 1248	1981 20A	USSR	Mar 5	Plesetsk	A-2	6,700	89.6	171	345	67.1	Reentered 4/4/81: photo reconnaissance
Kosmos 1249	1981 21A	USSR	Mar 5	Tyuratam	F-1-m	–	103.9	892	991	65.0	In orbit: ocean surveillance; nuclear power supply; paired with Kosmos 1266; radar
Kosmos 1250	1981 22A	USSR	Mar 6	Plesetsk	C-1	40	114.4	1,388	1,469	74.0	In orbit: military communications
Kosmos 1251	1981 22B	USSR	Mar 6	Plesetsk	C-1	40	114.6	1,402	1,470	74.0	In orbit: military communications
Kosmos 1252	1981 22C	USSR	Mar 6	Plesetsk	C-1	40	114.7	1,416	1,470	74.0	In orbit: military communications
Kosmos 1253	1981 22D	USSR	Mar 6	Plesetsk	C-1	40	115.6	1,466	1,494	74.0	In orbit: military communications
Kosmos 1254	1981 22E	USSR	Mar 6	Plesetsk	C-1	40	114.9	1,430	1,470	74.0	In orbit: military communications
Kosmos 1255	1981 22F	USSR	Mar 6	Plesetsk	C-1	40	115.0	1,444	1,470	74.0	In orbit: military communications
Kosmos 1256	1981 22G	USSR	Mar 6	Plesetsk	C-1	40	115.2	1,455	1,474	74.0	In orbit: military communications

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1257	1981 22H	USSR	Mar 6	Plesetsk	C-1	40	115.4	1,467	1,477	74.0	In orbit: military communications
Soyuz T4	1981 23A	USSR	Mar 12	Tyuratam	A-2	7,000	91.4	338	350	51.6	Vladimir Kovalyonok, Viktor Savinykh docked w/ Soyuz 6, 5/26. Returned 5/26/81 after 74 days, 17 hrs, 38 mn
Kosmos 1258	1981 24A	USSR	Mar 14	Tyuratam	F-1-m	–	97.9	301	1,024	65.8	Decayed 3/14/81: ASAT interceptor
None	1981 25A	US	Mar 16	ETR	Titan IIIC	–	1,436.2	35,776	35,801	1.3	In orbit
Kosmos 1259	1981 26A	USSR	Mar 17	Tyuratam	A-2	6,300	92.1	350	414	70.3	Reentered 3/31/81: photo reconnaissance
Raduga 8	1981 27A	USSR	Mar 18	Tyuratam	D-1-e	–	1,646.4	31,012	48,604	0.8	In orbit: communications
Kosmos 1260	1981 28A	USSR	Mar 20	Tyuratam	F-1-m	–	96.8	463	749	65.0	Decayed 5/22/82: ocean surveillance; replaced Kosmos 1167. Exploded 5/8/82, 68 pieces
Soyuz 39	1981 29A	USSR	Mar 22	Tyuratam	A-2	6,800	91.3	336	350	51.6	Vladimir Dzhanibekov, Jugderdemidyin Gurragcha docked w/ Salyut 6, 6/19. Returned 3/30/81 after 7 days, 20 hrs, 43 mn
Molniya 3-15	1981 30A	USSR	Mar 24	Plesetsk	A-2-e	1,500	717.8	1,622	38,733	64.9	In orbit: communications; replaced Molniya 3-11; on station 3/28/81
Kosmos 1261	1981 31A	USSR	Mar 31	Plesetsk	A-2-e	1,250	716.6	3,186	37,109	66.9	In orbit: early warning. Exploded 5/12/81, 7 pieces
Kosmos 1262	1981 32A	USSR	Apr 7	Plesetsk	A-2	6,300	90.3	196	392	72.8	Reentered 4/21/81: photo reconnaissance
Kosmos 1263	1981 33A	USSR	Apr 9	Plesetsk	C-1	550	108.6	392	1,873	83.0	In orbit: minor military
STS 1*	1981 34A	NASA	Apr 12	ETR	STS	4,908**	89.6	318	318	40.4	1st flight of U.S. Space Shuttle; Commander John Young, Pilot Robert Crippen landed Edwards AFB, 4/14/81, after 2 days, 6 hrs, 20 mns, 36 orbits.
Kosmos 1264	1981 35A	USSR	Apr 15	Tyuratam	A-2	6,300	92.3	361	416	70.3	Reentered 4/19/81: photo reconnaissance
Kosmos 1265	1981 36A	USSR	Apr 16	Plesetsk	A-2	6,300	89.6	226	289	72.8	Reentered 4/28/81: photo reconnaissance
Kosmos 1266	1981 37A	USSR	Apr 21	Tyuratam	F-1-m	–	103.6	915	941	64.8	In orbit: ocean surveillance; paired with Kosmos 1249, radar
None	1981 38A	USAF	Apr 24	WTR	Titan IIIB	–	93.0	188	708	62.7	In orbit
Kosmos 1267	1981 39A	USSR	Apr 25	Tyuratam	D-1	15,100	89.0	240	278	51.5	Reentered 7/29/82: space-station module; docked with Salyut 6, 6/19, capsule ejected 5/24/81
Kosmos 1268	1981 40A	USSR	Apr 28	Tyuratam	A-2	6,300	90.6	241	366	70.3	Reentered 5/12/81: photo reconnaissance

*Space Transportation System.

**Payload weight. Typical orbiter carries 13,000 kg of consumables; just short of orbit, 36,000 kg-external tank and unused main engine propellants are jettisoned.

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1269	1981 41A	USSR	May 7	Plesetsk	C-1	750	100.8	789	805	74.1	In orbit: store/dump communications; replaced Kosmos 1110
Soyuz 40	1981 42A	USSR	May 14	Tyuratam	A-2	6,800	91.3	331	345	51.6	Leonid Popov, Dumitru Prunariu docked w/ Salyut 6, 5/15. Returned 5/22/81 after 7 days, 20 hrs, 38 mn
Meteor 2-7	1981 43A	USSR	May 14	Plesetsk	A-1	2,750	102.3	849	887	81.3	In orbit: meteorological
Nova 1	1981 44A	US	May 15	WTR	Scout	–	Elements not available				In orbit: navigation
Kosmos 1270	1981 45A	USSR	May 18	Tyuratam	A-2	6,700	89.7	173	348	64.8	Reentered 6/17/81: photo reconnaissance
Kosmos 1271	1981 46A	USSR	May 19	Plesetsk	A-1	2,500	97.1	611	631	81.2	In orbit: elint; replaced Kosmos 1077
Kosmos 1272	1981 47A	USSR	May 21	Tyuratam	A-2	6,300	92.3	361	416	70.3	Reentered 6/4/81: photo reconnaissance
Kosmos 1273	1981 48A	USSR	May 22	Plesetsk	A-2	5,900	89.1	211	249	82.3	Reentered 6/4/81: earth resources
GOES 5	1981 49A	US	May 22	ETR	Delta	836	1,436.0	35,781	35,788	0.1	In orbit: meteorological
Intelsat V F-1	1981 50A	NASA	May 23	ETR	Atlas-Centaur	1,928	1,436.2	35,767	35,809	0.1	In orbit: commercial communications for Intelsat
Rohini 2	1981 51A	India	May 31	Srihari-Kota	SLV-3	38	90.5	186	418	46.3	Reentered 6/8/81: earth resources
Kosmos 1274	1981 52A	USSR	Jun 3	Plesetsk	A-2	6,700	89.7	170	353	67.1	Reentered 7/3/81: photo reconnaissance
Kosmos 1275	1981 53A	USSR	Jun 4	Plesetsk	C-1	810	104.8	957	1,010	83.0	In orbit: navigation; replaced Kosmos 1141, Exploded 7/24/81, 283 pieces
Molniya 3-16	1981 54A	USSR	Jun 9	Plesetsk	A-2-e	1,500	717.6	652	39,693	64.2	In orbit: communications; replaced Molniya 3-14; on station 6/13/81
Kosmos 1276	1981 55A	USSR	Jun 16	Plesetsk	A-2	5,900	89.0	214	237	82.3	Reentered 6/28/81: earth resources
Kosmos 1277	1981 56A	USSR	Jun 17	Tyuratam	A-2	6,300	92.3	360	416	70.4	Reentered 7/1/81: photo reconnaissance
Meteosat 2	1981 57A	ESA	Jun 19	Kourou	Ariane	697	1,436.3	35,790	35,793	0.3	In orbit: Indian communications
Apple	1981 57B	ESA	Jun 19	Kourou	Ariane	–	1,447.7	35,548	36,478	0.8	In orbit
CAT 3	*1981 57C*	*ESA*	*Jun 19*	*Kourou*	*Ariane*	–	*581.8*	*279*	*33,138*	*10.4*	*In orbit: test equipment*
Kosmos 1278	1981 58A	USSR	Jun 19	Plesetsk	A-2-e	1,250	717.8	2,702	37,654	67.1	In orbit: early warning. Exploded 12/86, 5 pieces
NOAA 7	1981 59A	US	Jun 23	WTR	Atlas F	1,405	101.8	838	858	99.1	In orbit: meteorological

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Molniya 1-50	1981 60A	USSR	Jun 24	Plesetsk	A-2-e	1,000	717.9	1,913	38,447	64.8	In orbit: communications; replaced Molniya 1-42, on station 6/30/81
Ekran 7	1981 61A	USSR	Jun 26	Tyuratam	D-1-e	–	1,436.2	35,766	35,810	4.5	In orbit: communications
Kosmos 1279	1981 62A	USSR	Jul 1	Tyuratam	A-2	6,300	92.3	358	418	70.4	Reentered 7/15/81: photo reconnaissance
Kosmos 1280	1981 63A	USSR	Jul 2	Plesetsk	A-2	6,300	89.8	258	273	82.3	Reentered 7/15/81: earth resources
Kosmos 1281	1981 64A	USSR	Jul 7	Plesetsk	A-2	6,300	92.2	357	414	72.8	Reentered 7/21/81: photo reconnaissance
Meteor 1-31	1981 65A	USSR	Jul 10	Plesetsk	A-1	2,200	97.4	607	659	97.7	In orbit: meteorological/natural resources
Kosmos 1282	1981 66A	USSR	Jul 15	Tyuratam	A-2	6,700	89.5	172	336	64.9	Reentered 8/14/81: photo reconnaissance
Kosmos 1283	1981 67A	USSR	Jul 17	Plesetsk	A-2	6,300	91.5	325	371	82.3	Reentered 7/31/81: earth resources
Kosmos 1284	1981 68A	USSR	Jul 29	Plesetsk	A-2	6,300	91.4	325	370	82.3	Reentered 8/12/81: earth resources
Raduga 9	1981 69A	USSR	Jul 30	Tyuratam	D-1-e	–	1,435.0	35,754	35,774	4.3	In orbit: communications
Dynamics-Explorer 1	1981 70A	NASA	Aug 3	WTR	Delta	403	410	464	23,370	89.5	In orbit: scientific; dual launch
Dynamics-Explorer 2	1981 70B	NASA	Aug 3	WTR	Delta	–	98	298	996	90.0	Decayed 2/19/83; scientific
Kosmos 1285	1981 71A	USSR	Aug 4	Plesetsk	A-2-e	1,250	727.0	3,137	37,668	66.9	In orbit: early warning; replacement for Kosmos 1261. Exploded 11/21/81 6 pieces
Kosmos 1286	1981 72A	USSR	Aug 4	Tyuratam	F-1-m	–	93.4	433	447	65.0	Decayed 10/16/82: ocean surveillance; exploded 9/29/82, 30 pieces
FltSatCom 5	1981 73A	USN	Aug 6	ETR	Atlas-Centaur	1,884	1,460.0	36,218	36,2[illegible]	4.3	In orbit: military communications
Kosmos 1287	1981 74A	USSR	Aug 6	Plesetsk	C-1	40	115.7	1,463	1,510	74.0	In orbit: communications
Kosmos 1288	1981 74B	USSR	Aug 6	Plesetsk	C-1	40	115.5	1,463	1,490	74.0	In orbit: communications
Kosmos 1289	1981 74C	USSR	Aug 6	Plesetsk	C-1	40	114.7	1,423	1,463	74.0	In orbit: communications
Kosmos 1290	1981 74D	USSR	Aug 6	Plesetsk	C-1	40	114.9	1,439	1,464	74.0	In orbit: communications
Kosmos 1291	1981 74E	USSR	Aug 6	Plesetsk	C-1	40	115.1	1,455	1,463	74.0	In orbit: communications
Kosmos 1292	1981 74F	USSR	Aug 6	Plesetsk	C-1	40	115.3	1,462	1,474	74.0	In orbit: communications

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1293	1981 74G	USSR	Aug 6	Plesetsk	C-1	40	114.6	1,406	1,464	74.0	In orbit: communications
Kosmos 1294	1981 74H	USSR	Aug 6	Plesetsk	C-1	40	114.4	1,390	1,463	74.0	In orbit: communications
Interkosmos 22 (Bulgaria 1300)	1981 75A	USSR	Aug 7	Plesetsk	A-1	1,500	101.8	795	890	81.2	In orbit: scientific; ionospheric and magnetospheric research
GMS 2 (Himawari 2)	1981 76A	Japan	Aug 10	Tanega-shima	N-2	670	1,436.2	35,766	35,811	2.9	In orbit: meteorological
Kosmos 1295	1981 77A	USSR	Aug 12	Plesetsk	C-1	700	104.7	946	1,010	82.9	In orbit: navigation; replaced Kosmos 1181
Kosmos 1296	1981 78A	USSR	Aug 13	Plesetsk	A-2	6,700	89.7	169	357	67.1	Reentered 9/13/81: photo reconnaissance
Kosmos 1297	1981 79A	USSR	Aug 18	Plesetsk	A-2	6,300	89.8	225	304	72.8	Reentered 8/25/81: photo reconnaissance
Kosmos 1298	1981 80A	USSR	Aug 21	Tyuratam	A-2	6,700	89.5	173	330	64.9	Reentered 10/2/81: photo reconnaissance
Kosmos 1299	1981 81A	USSR	Aug 24	Tyuratam	F-1-m	–	104.0	906	984	65.1	In orbit: ocean surveillance; nuclear power supply; raised on 9/6; worked with Kosmos 1260 & 1266; radar
Kosmos 1300	1981 82A	USSR	Aug 24	Plesetsk	F-2	–	97.5	622	652	82.5	In orbit: oceanographic
Kosmos 1301	1981 83A	USSR	Aug 27	Plesetsk	A-2	6,300	89.8	259	272	82.3	Reentered 9/10/81: earth resources
Kosmos 1302	1981 84A	USSR	Aug 28	Plesetsk	C-1	750	100.7	778	806	74.0	In orbit: military communications; replaced Kosmos 1269
None	1981 85A	USAF	Sep 3	WTR	Titan IIID	13,300	92.5	273	517	97.0	Reentered 11/23/84: reconnaissance
Kosmos 1303	1981 86A	USSR	Sep 4	Tyuratam	A-2	6,300	92.3	360	415	70.4	Reentered 9/18/81: photo reconnaissance
Kosmos 1304	1981 87A	USSR	Sep 4	Plesetsk	C-1	810	103.8	905	977	82.9	In orbit: navigation; replaced Kosmos 926
Kosmos 1305	1981 88A	USSR	Sep 11	Plesetsk	A-2-e	1,000	263.7	627	13,859	62.9	In orbit: communications failure, last stage exploded, 7 pieces
Kosmos 1306	1981 89A	USSR	Sep 14	Tyuratam	F-1-m	–	93.3	427	441	64.9	Decayed 7/16/82: ocean surveillance; replaced Kosmos 1260; exploded 7/12/82, 27 pieces
Kosmos 1307	1981 90A	USSR	Sep 15	Plesetsk	A-2	6,300	92.2	354	417	72.8	Reentered 9/28/81: photo reconnaissance
Kosmos 1308	1981 91A	USSR	Sep 18	Plesetsk	C-1	700	104.7	959	1,004	82.9	In orbit: navigation; replaced Kosmos 1275
Kosmos 1309	1981 92A	USSR	Sep 18	Plesetsk	A-2	5,700	89.1	214	253	82.3	Reentered 10/1/81: photo reconnaissance
PRC 9	1981 93A	PRC	Sep 19	Shuang Cheng Tzu	FB-1	–	103.0	232	1,598	59.4	Reentered 9/26/81: scientific

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
PRC 10	1981 93B	PRC	Sep 19	Shuang Cheng Tzu	FB-1		103.5	235	1,615	59.4	Earth resources, reentered 10/6/82
PRC 11	1981 93C	PRC	Sep 19	Shuang Cheng Tzu	FB-1		103.3	235	1,598	59.5	Earth resources, reentered 8/17/82
Oreol 3	1981 94A	USSR	Sep 21	Plesetsk	A-2/F-2?	1,000	108.4	400	1,903	82.5	In orbit: scientific; Soviet/French magnetosphere and ionospheric explorer
Kosmos 1310	1981 95A	USSR	Sep 23	Plesetsk	C-1	–	93.0	401	438	65.8	In orbit: minor military
SBS 2	1981 96A	US	Sep 24	ETR	Thor-Delta	550	1,436.1	35,785	35,787	0.0	In orbit: commercial communications for Satellite Business Systems Corp.
Kosmos 1311	1981 97A	USSR	Sep 28	Plesetsk	C-1	–	94.0	444	493	83.0	Decayed 8/28/83: minor military
Kosmos 1312	1981 98A	USSR	Sep 30	Plesetsk	F-2	–	115.9	1,490	1,499	82.6	In orbit
Kosmos 1313	1981 99A	USSR	Oct 1	Tyuratam	A-2	6,300	89.6	231	279	70.3	Reentered 10/15/81: photo reconnaissance
SME	1981 100A	NASA	Oct 6	WTR	Thor-Delta	437	94.7	504	506	97.7	In orbit: Solar Mesophere Explorer; scientific; dual launch
UOSAT	1981 100B	NASA/UK	Oct 6	WTR	Thor-Delta	52	94.1	472	478	97.7	In orbit: British radio science
Kosmos 1314	1981 101A	USSR	Oct 9	Plesetsk	A-2	63,00	88.9	212	235	82.3	Reentered 10/22/81: earth resources
Raduga 10	1981 102A	USSR	Oct 9	Tyuratam	D-1-e	–	1,436.2	35,781	35,796	4.2	In orbit: communications
Kosmos 1315	1981 103A	USSR	Oct 13	Plesetsk	A-1	2,500	97.4	612	651	81.2	In orbit: elint; replaced Kosmos 1154
Kosmos 1316	1981 104A	USSR	Oct 15	Tyuratam	A-2	6,300	89.6	232	278	70.3	Reentered 10/29/81: photo reconnaissance
Molniya 3-17	1981 105A	USSR	Oct 17	Plesetsk	A-2-e	1,500	717.8	2,569	37,785	64.5	In orbit: communications; replaced Molniya 3-12; on station 10/21
Venera 13	1981 106A	USSR	Oct 30	Tyuratam	D-1-e	–	Heliocentric orbit				In orbit: Venus lander; soft landing on Venus 3/82
None	1981 107A	USAF	Oct 31	ETR	Titan IIIC	–	Elements not available				In orbit
Kosmos 1317	1981 108A	USSR	Oct 31	Plesetsk	A-2-e	1,250	719.0	3,070	37,343	64.4	In orbit. Exploded 1/25/84, 7 pieces
Kosmos 1318	1981 109A	USSR	Nov 3	Plesetsk	A-2	6,700	89.7	171	352	67.1	Reentered 12/4/81: photo reconnaissance

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Venera 14	1981 110A	USSR	Nov 4	Tyuratam	D-1-e	–	Heliocentric orbit				In orbit: Venus lander; soft landing on Venus 3/82
STS 2	1981 111A	US	Nov 12	ETR	STS	8,516*	89.6	259	259	38	Richard Truly, commander, Joe Engle, pilot aboard 2nd shuttle flight. Landed Edwards AFB after 2 days, 6 hrs, 13 mns, total 36 orbits
Kosmos 1319	1981 112A	USSR	Nov 13	Tyuratam	A-2	6,300	92.1	350	413	70.3	Reentered 11/27/81: photo reconnaissance
Molniya 1-51	1981 113A	USSR	Nov 17	Plesetsk	A-2-e	1,000	717.5	510	39,830	64.1	In orbit: communications; replaced Molniya 1-39; on station 12/4
RCA Satcom IV	1981 114A	NASA	Nov 20	ETR	Delta	1,078	1,436.2	35,779	35,794	0.0	In orbit: commerical communications for RCA.
Bhaskara 2	1981 115A	India	Nov 20	Kapustin Yar	C-1	444	94.8	498	518	50.6	In orbit: Indian; earth resources
Kosmos 1320	1981 116A	USSR	Nov 28	Plesetsk	C-1	40	117.2	1,478	1,633	74.0	In orbit: communications
Kosmos 1321	1981 116B	USSR	Nov 28	Plesetsk	C-1	40	117.2	1,479	1,630	74.0	In orbit: communications
Kosmos 1322	1981 116C	USSR	Nov 28	Plesetsk	C-1	40	117.2	1,478	1,628	74.0	In orbit: communications
Kosmos 1323	1981 116D	USSR	Nov 28	Plesetsk	C-1	40	117.1	1,479	1,623	74.0	In orbit: communications
Kosmos 1324	1981 116E	USSR	Nov 28	Plesetsk	C-1	40	117.1	1,478	1,619	74.0	In orbit: communications
Kosmos 1325	1981 116F	USSR	Nov 28	Plesetsk	C-1	40	117.0	1,478	1,616	74.0	In orbit: communications
Kosmos 1326	1981 116G	USSR	Nov 28	Plesetsk	C-1	40	117.0	1,478	1,610	74.0	In orbit: communications
Kosmos 1327	1981 116H	USSR	Nov 28	Plesetsk	C-1	40	116.9	1,479	1,602	74.0	In orbit: communications
Kosmos 1328	1981 117A	USSR	Dec 3	Plesetsk	F-2	–	97.6	631	660	82.5	In orbit: oceanographic
Kosmos 1329	1981 118A	USSR	Dec 4	Tyuratam	A-2	6,300	89.4	233	261	65.0	Reentered 11/18/81: photo reconnaissance
Intelsat V F-3	1981 119A	NASA	Dec 15	ETR	Atlas-Centaur	1,870	1,436.1	35,773	35,800	0.1	In orbit: commercial communications for Intelsat
Radio 3	1981 120A	USSR	Dec 17	Plesetsk	C-1	–	118.4	1,561	1,657	83.0	In orbit: amateur radio
Radio 8	1981 120B	USSR	Dec 17	Plesetsk	C-1	–	119.6	1,648	1,681	83.0	In orbit: amateur radio
Radio 5	1981 120C	USSR	Dec 17	Plesetsk	C-1	–	119.4	1,648	1,663	83.0	In orbit: amateur radio

*Payload weight

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Radio 4	1981 120D	USSR	Dec 17	Plesetsk	C-1	–	119.3	1,634	1,662	83.0	In orbit: amateur radio
Radio 7	1981 120E	USSR	Dec 17	Plesetsk	C-1	–	119.1	1,621	1,657	83.0	In orbit: amateur radio
Radio 6	1981 120F	USSR	Dec 17	Plesetsk	C-1	–	118.6	1,577	1,658	83.0	In orbit: amateur radio
NAVSTAR	–	US	Dec 18	WTR	Atlas E	–	–	–	–	–	Launch failure: navigation
Kosmos 1330	1981 121A	USSR	Dec 19	Tyuratam	A-2	6,700	89.6	160	348	70.4	Reentered 1/19/82: photo reconnaissance
Marecs 1	1981 122A	ESA	Dec 20	Kourou	Ariane	582	1,436.1	35,770	35,807	0.9	In orbit: final development flight of Ariane; maritime communications
CAT 4	1981 122B	ESA	Dec 20	Kourou	Ariane	217	599.7	241	34,115	10.4	In orbit: test equipment on Ariane launch vehicle
Molniya 1-52	1981 123A	USSR	Dec 23	Tyuratam	A-2-e	1,000	717.8	1,544	38,810	63.4	In orbit: communications; replaced Molniya 1-45; on station 12/30/81
Kosmos 1331	1982 1A	USSR	Jan 7	Plesetsk	C-1	750	100.6	768	806	74.0	In orbit: communications; replaced Kosmos 1302
Kosmos 1332	1982 2A	USSR	Jan 12	Plesetsk	A-2	5,700	89.0	210	248	82.3	Reentered 1/25/82: photo recon
Kosmos 1333	1982 3A	USSR	Jan 14	Plesetsk	C-1	810	104.9	966	1,012	82.9	In orbit: navigation; replaced Kosmos 1150
RCA Satcom IV	1982 4A	US	Jan 16	ESMC	Delta	1,082	1,436.2	35,779	35,797	0.0	In orbit: commerical communications
Kosmos 1334	1982 5A	USSR	Jan 20	Plesetsk	A-2	6,300	89.6	226	289	72.8	Reentered 2/3/82: photo recon, maneuvered
None	1982 6A	US	Jan 21	WSMC	Titan IIIB-Agena	–	97.4	630	641	97.2	Decayed 5/23/82
Kosmos 1335	1982 7A	USSR	Jan 29	Plesetsk	C-1	550	94.5	479	514	74.0	Decayed 4/5/87. Minor military; replaced Kosmos 1186
Kosmos 1336	1982 8A	USSR	Jan 30	Tyuratam	A-2	6,700	89.7	169	356	70.3	Reentered 2/26/82: photo recon, maneuvered
Ekran 8	1982 9A	USSR	Feb 5	Tyuratam	D-1-e	4,000	1,441.0	35,766	35,998	4.0	In orbit: communications
Kosmos 1337	1982 10A	USSR	Feb 11	Tyuratam	F-1-m	1,500	93.3	428	446	65.0	Decayed 7/25/82: ocean surveillance; paired with Kosmos 1306
Kosmos 1338	1982 11A	USSR	Feb 16	Plesetsk	A-2	6,000	92.2	359	411	72.8	Reentered 3/2/82: photo recon, maneuvered
Kosmos 1339	1982 12A	USSR	Feb 17	Plesetsk	C-1	810	104.7	948	1,015	82.9	In orbit: navigation; replaced Kosmos 1092
Kosmos 1340	1982 13A	USSR	Feb 19	Plesetsk	A-1	2,500	97.3	621	638	81.2	In orbit: elint; replaced Kosmos 1206
Westar VI	1982 14A	US	Feb 26	ESMC	Delta 3910	1,072	1,436.2	35,772	35,806	0.1	In orbit: replaced Westar I; TV, voice & facimile data

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Molniya 1-53	1982 15A	USSR	Feb 26	Plesetsk	A-2-e	1,000	717.9	2,180	38,179	63.8	In orbit: communications; replaced Molniya 1-47; on station 3/3
Kosmos 1341	1982 16A	USSR	Mar 3	Plesetsk	A-2-e	1,250	719.0	2,611	37,805	66.8	In orbit: early warning; replaced Kosmos 1247; on station 3/10
Intelsat V F-4	1982 17A	ITSO*	Mar 5	ESMC	Atlas-Centaur	1,928	1,436.2	35,773	35,805	0.1	In orbit: international communications
Kosmos 1342	1982 18A	USSR	Mar 5	Plesetsk	A-2	6,300	89.6	227	288	72.8	Reentered 3/19/82: photo recon, maneuvered
None	1982 19A	US	Mar 6	ESMC	Titan IIIC	–	1,435.9	35,769	35,796	1.3	In orbit: development of spacecraft techniques and technology
Gorizont 5	1982 20A	USSR	Mar 15	Tyuratam	D-1-e	–	1,436.0	35,774	35,796	3.3	In orbit: communications
Kosmos 1343	1982 21A	USSR	Mar 17	Plesetsk	A-2	6,300	89.6	228	288	72.8	Reentered 3/31/82: photo recon, maneuvered
STS 3	1982 22A	US	Mar 22	KSC	Columbia	10,299**	89.4	247	247	38.0	Jack Lousma, commander; Gordon Fullerton, pilot flew 8 day, 4 mn mission, landing 3/30/82 at White Sands, New Mexico
Molniya 3-18	1982 23A	USSR	Mar 24	Plesetsk	A-2-e	1,500	717.8	1,500	38,856	64.9	In orbit: communications; replaced Molniya 3-15, on station 4/10
Kosmos 1344	1982 24A	USSR	Mar 24	Plesetsk	C-1	810	104.9	970	1,010	82.9	In orbit: navigation; replaced Kosmos 1244
Meteor 2-8	1982 25A	USSR	Mar 25	Plesetsk	F-2	2,750	104.0	941	962	82.5	In orbit: meteorological
Kosmos 1345	1982 26A	USSR	Mar 31	Plesetsk	C-1	900	94.2	461	494	74.0	In orbit: elint
Kosmos 1346	1982 27A	USSR	Mar 31	Plesetsk	A-1	2,500	97.4	613	650	81.2	In orbit: elint; replaced Kosmos 1222
Kosmos 1347	1982 28A	USSR	Apr 2	Tyuratam	A-2	6,700	89.6	171	337	70.3	Reentered 5/21/82: photo recon, maneuvered
Kosmos 1348	1982 29A	USSR	Apr 7	Plesetsk	A-2-e	1,250	719.1	2,545	37,872	63.1	In orbit: early warning, replaced Kosmos 1172; on station 4/15
Kosmos 1349	1982 30A	USSR	Apr 8	Plesetsk	C-1	810	104.9	968	1,012	82.9	In orbit: navigation; replaced Kosmos 1153
Insat 1A	1982 31A	India	Apr 10	ESMC	Thor Delta	1,152	1,434.2	35,562	35,936	0.1	In orbit: provides nationwide direct broadcasting to community TV receivers in rural areas of India
Kosmos 1350	1982 32A	USSR	Apr 15	Plesetsk	A-2	6,700	89.8	171	357	67.1	Reentered 5/16/82: photo recon, maneuvered
Salyut 7	1982 33A	USSR	Apr 19	Tyuratam	D-1-h	18,900	94.1	473	474	51.6	In orbit: space station; replaced Salyut 6
Iskra 2	1982 33C	USSR	May 17	Salyut 7	–	28	91.3	340	345	51.6	Decayed 7/9/82: amateur radio; ejected from Salyut 7, 5/17/82

*International Telecommunications Satellite Organization

**Payload weight

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Iskra 3	1982 33D	USSR	Nov 18	Salyut 7	–	28	91.5	349	353	51.6	Decayed 12/16/82: amateur radio; brought to Salyut 7 by Progress 16; ejected 11/18/82
Kosmos 1351	1982 34A	USSR	Apr 21	Kapustin Yar	C-1	550	93.5	349	546	50.6	Decayed 3/14/83: minor military
Kosmos 1352	1982 35A	USSR	Apr 21	Tyuratam	A-2	6,300	92.1	349	415	70.3	Reentered 5/5/82: photo recon, maneuvered
Kosmos 1353	1982 36A	USSR	Apr 23	Plesetsk	A-2	5,900	89.0	211	241	82.3	Reentered 5/6/82: photo recon, maneuvered
Kosmos 1354	1982 37A	USSR	Apr 28	Plesetsk	C-1	750	100.8	794	807	74.0	In orbit: communications; replaced Kosmos 1190
Kosmos 1355	1982 38A	USSR	Apr 29	Tyuratam	F-1-m	–	93.3	428	446	65.0	Decayed 8-27-83: ocean surveillance; paired with Kosmos 1405. Multiple explosions 8/8/83 and later, 30 pieces
Kosmos 1356	1982 39A	USSR	May 5	Plesetsk	A-1	2,500	97.6	623	661	81.2	In orbit: elint; replaced Kosmos 1184
Kosmos 1357	1982 40A	USSR	May 6	Plesetsk	C-1	40	114.6	1,402	1,479	74.0	In orbit: communications
Kosmos 1358	1982 40B	USSR	May 6	Plesetsk	C-1	40	114.8	1,416	1,481	74.0	In orbit: communications
Kosmos 1359	1982 40C	USSR	May 6	Plesetsk	C-1	40	115.0	1,433	1,481	74.0	In orbit: communications
Kosmos 1360	1982 40D	USSR	May 6	Plesetsk	C-1	40	115.2	1,447	1,483	74.0	In orbit: communications
Kosmos 1361	1982 40E	USSR	May 6	Plesetsk	C-1	40	115.3	1,462	1,484	74.0	In orbit: communications
Kosmos 1362	1982 40F	USSR	May 6	Plesetsk	C-1	40	115.5	1,467	1,496	74.0	In orbit: communications
Kosmos 1363	1982 40G	USSR	May 6	Plesetsk	C-1	40	115.7	1,474	,1506	74.0	In orbit: communications
Kosmos 1364	1982 40H	USSR	May 6	Plesetsk	C-1	40	115.9	1,474	1,525	74.0	In orbit: communications
None	1982 41A	US	May 11	WSMC	Titan IIID	–	88.6	157	251	96.3	Decayed 12/5/82
Soyuz T5	1982 42A	USSR	May 13	Tyuratam	A-2	6,850	91.4	343	345	51.5	Anatoli Berezovoi, Valentin Lebedev docked w/ Salyut 7, 4/19. Remained for 211 days, 8 hrs, 5 mns, returning aboard Soyuz T7. Soyuz T5 returned Soyuz T7 crew, 8/27/82
Kosmos 1365	1982 43A	USSR	May 14	Tyuratam	F-1-m	1,500	103.7	892	970	65.1	In orbit: ocean surveillance, nuclear power supply; raised 9/27/82; paired with Kosmos 1372
Kosmos 1366	1982 44A	USSR	May 17	Tyuratam	D-1-e	4,000	1,436.18	35,765	35,808	3.4	In orbit: communications; new SHF transponders
Kosmos 1367	1982 45A	USSR	May 20	Plesetsk	A-2-e	1,250	718.9	2,230	38,180	63.5	In orbit: early warning; established 9th plane on station 5/23/82

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1368	1982 46A	USSR	May 21	Tyuratam	A-2	6,300	90.0	210	340	70.3	Reentered 6/3/82: photo recon, maneuvered
Progress 13	1982 47A	USSR	May 23	Tyuratam	A-2	7,020	91.3	338	343	51.6	Reentered 6/6/82: resupply to Salyut 7; docked 5/25/82
Kosmos 1369	1982 48A	USSR	May 25	Plesetsk	A-2	6,300	89.9	267	274	82.3	Reentered 6/8/82: photo recon, maneuvered
Kosmos 1370	1982 49A	USSR	May 28	Tyuratam	A-2	6,700	89.2	197	275	64.8	Reentered 7/11/82: photo recon, maneuvered
Molniya 1-54	1982 50A	USSR	May 28	Plesetsk	A-2-e	1,000	717.8	1,059	39,295	64.9	In orbit: communications; replaced Molniya 1-44; on station 6/3/82
Kosmos 1371	1982 51A	USSR	Jun 1	Plesetsk	C-1	750	100.8	791	811	74.0	In orbit: replaced Kosmos 1140
Kosmos 1372	1982 52A	USSR	Jun 1	Tyuratam	F-1-m	1,500	103.9	929	956	64.9	In orbit: ocean surveillance, nuclear power supply; raised 8/11/82; paired with Kosmos 1365
Kosmos 1373	1982 53A	USSR	Jun 2	Tyuratam	A-2	6,300	92.7	365	442	70.4	Reentered 6/16/82: photo recon, maneuvered
Kosmos 1374	1982 54A	USSR	Jun 3	Kapustin Yar	C-1	1,000	88.1	158	204	50.6	Man related. Recovered 6/3/82 after 1 1/4 revolutions
Kosmos 1375	1982 55A	USSR	Jun 6	Plesetsk	C-1	2,000	105.0	980	1,010	65.8	In orbit: ASAT target; intercepted by Kosmos 1379. Exploded 10/21/85, 50 pieces
Kosmos 1376	1982 56A	USSR	Jun 8	Plesetsk	A-2	6,300	89.8	259	272	82.3	Reentered 6/22/82: photo recon, maneuvered
Kosmos 1377	1982 57A	USSR	Jun 8	Tyuratam	A-2	6,700	89.9	173	367	64.9	Reentered 7/22/82: photo recon, maneuvered
Westar 5	1982 58A	US	Jun 9	ESMC	Delta	1,072	1,436.1	35,782	35,791	0.1	In orbit: relay voice data, video & facimile to U.S., Hawaii, Alaska, Puerto Rico & Virgin Islands
Kosmos 1378	1982 59A	USSR	Jun 10	Plesetsk	F-2	2,200	97.5	626	653	82.5	In orbit: oceanographic phased with Kosmos 1300 and 1328
Kosmos 1379	1982 60A	USSR	Jun 18	Tyuratam	F-1-m	1,500	100.4	537	1,019	65.8	Decayed 6/18/82: ASAT, passed near Kosmos 1375 after 2 revolutions
Kosmos 1380	1982 61A	USSR	Jun 18	Plesetsk	C-1	810	93.2	140	725	82.9	Reentered 6/27/82: navigation, intended to replace Kosmos 1225
Kosmos 1381	1982 62A	USSR	Jun 18	Tyuratam	A-2	6,300	92.6	360	451	70.3	Reentered 7/1/82: photo recon, maneuvered
Soyuz T6	1982 63A	USSR	Jun 24	Tyuratam	A-2	6,850	90.4	283	306	51.6	Visiting Vladimir Dzhanibekov, Alexander Ivanchenkov, Jean-Loup Chretien docked w/ Salyut 7, 6/25. Returned 7/2/82 after 7 days, 22 hrs, 42 mns
Kosmos 1382	1982 64A	USSR	Jun 25	Plesetsk	A-2-e	1,250	717.9	3,021	37,340	64.5	In orbit: early warning; replaced Kosmos 1223, on station 6/29/82

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
STS-4	1982 65A	US	Jun 27	KSC	Columbia	11,107*	90.6	318	318	28.5	Final shuttle test flight. Commander Ken Mattingly, Pilot Hank Hartsfield flew 7 day, 1 hr, 9 mn mission, landing 7/4/82
Kosmos 1383	1982 66A	USSR	Jun 29	Plesetsk	C-1	810	105.3	989	1,028	82.9	In orbit: navigation; replaced Kosmos 1223, on station 6/29/82
Kosmos 1384	1982 67A	USSR	Jun 30	Plesetsk	A-2	6,700	89.7	171	356	67.1	Reentered 7/30/82: photo recon, maneuvered
Kosmos 1385	1982 68A	USSR	Jul 6	Plesetsk	A-2	6,300	91.4	307	388	82.3	Reentered 7/20/82: photo recon, maneuvered
Kosmos 1386	1982 69A	USSR	Jul 7	Plesetsk	C-1	810	104.7	947	1,008	83.0	In orbit: navigation; replaced Kosmos 1225
Progress 14	1982 70A	USSR	Jul 10	Tyuratam	A-2	7,020	90.8	306	325	51.6	Reentered 8/13/82: resupply to Salyut 7; docked 7/12/82
Kosmos 1387	1982 71A	USSR	Jul 13	Plesetsk	A-2	5,900	89.0	211	242	82.3	Reentered 7/26/82: photo recon, no major maneuver
Landsat 4	1982 72A	US	Jul 16	WSMC	Thor Delta	1,942	98.8	699	701	98.2	In orbit: acquire multispectral imagery sufficient to improve remote sensing techniques and test new instrument, thematic mapper
Kosmos 1388	1982 73A	USSR	Jul 21	Plesetsk	C-1	40	114.5	1,394	1,475	74.0	In orbit: communications
Kosmos 1389	1982 73B	USSR	Jul 21	Plesetsk	C-1	40	114.7	1,410	1,476	74.0	In orbit: communications
Kosmos 1390	1982 73C	USSR	Jul 21	Plesetsk	C-1	40	114.9	1,428	1,475	74.0	In orbit: communications
Kosmos 1391	1982 73D	USSR	Jul 21	Plesetsk	C-1	40	115.0	1,444	1,476	74.0	In orbit: communications
Kosmos 1392	1982 73E	USSR	Jul 21	Plesetsk	C-1	40	115.2	1,461	1,475	74.0	In orbit: communications
Kosmos 1393	1982 73F	USSR	Jul 21	Plesetsk	C-1	40	115.4	1,470	1,484	74.0	In orbit: communications
Kosmos 1394	1982 73G	USSR	Jul 21	Plesetsk	C-1	40	115.6	1,475	1,497	74.0	In orbit: communications
Kosmos 1395	1982 73H	USSR	Jul 21	Plesetsk	C-1	40	115.8	1,474	1,517	74.0	In orbit: communications
Molniya 1-55	1982 74A	USSR	Jul 21	Tyuratam	A-2-e	1,000	717.8	1,565	38,291	64.9	In orbit: communications; replaced Molniya 1-46, on station 7/27/82
Ekran	None	USSR	Jul 23	Tyuratam	D-1-e	–	–	–	–	–	1st stage failure
Kosmos 1396	1982 75A	USSR	Jul 27	Plesetsk	A-2	6,300	89.6	228	287	72.8	Reentered 8/10/82: photo recon, maneuvered
Kosmos 1397	1982 76A	USSR	Jul 29	Kapustin Yar	C-1	550	93.4	345	541	50.6	Decayed 5/18/83: minor military
Kosmos 1398	1982 77A	USSR	Aug 3	Plesetsk	A-2	5,900	88.9	215	234	82.3	Reentered 8/13/82: photo recon, no major maneuver

*Payload weight

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1399	1982 78A	USSR	Aug 4	Tyuratam	A-2	6,700	89.6	170	343	64.9	Reentered 9/16/82: photo recon, maneuvered
Kosmos 1400	1982 79A	USSR	Aug 5	Plesetsk	A-1	2,500	97.3	620	642	81.2	In orbit: elint; replaced Kosmos 1315
Soyuz T7	1982 80A	USSR	Aug 19	Tyuratam	A-2	6,850	90.4	290	299	51.6	Leonid Popov, Alexander Serebrov, Svetlana Savitskaya visited Salyut 7, docking 8/20. Returned aboard Soyuz T5. Soyuz T7 returned Soyuz T5 crew 12/10/82
Kosmos 1401	1982 81A	USSR	Aug 20	Plesetsk	A-2	6,300	89.8	260	272	82.3	Reentered 9/3/82: photo recon, maneuvered
Anik-D-1	1982 82A	Canada	Aug 26	ESMC	Delta	730*	1,436.1	35,774	35,802	0.0	In orbit: Canadian communications (Telesat G)
Molniya 3-19	1982 83A	USSR	Aug 27	Plesetsk	A-2-e	1500	717.3	1,005	39,325	63.5	In orbit: communications; replaced Molniya 3-13, on station 9/25/82
Kosmos 1402	1982 84A	USSR	Aug 30	Tyuratam	F-1-m	3,000	89.6	251	264	65.0	Decayed 1/23/83: ocean surveillance; worked with Kosmos 1365 & 1412. Reactor decayed 2/83
Kosmos 1403	1982 85A	USSR	Sep 1	Tyuratam	A-2	6,300	92.2	353	415	70.3	Reentered 9/15/82: photo recon, maneuvered
Kosmos 1404	1982 86A	USSR	Sep 1	Plesetsk	A-2	6,300	92.2	357	415	72.8	Reentered 9/15/82: photo recon, maneuvered
ETS-3 (Kiku 4)	1982 87A	Japan	Sep 3	Tanega-shima	N-1	385	107.2	968	1,228	44.6	In orbit: verified 3-axis attitude control using telemetry data received via tape recorder, solar array deployment & active thermal control, and other experiments
Kosmos 1405	1982 88A	USSR	Sep 4	Tyuratam	F-1-m	1,500	93.3	427	445	65.0	Decayed 2/5/84: ocean surveillance; paired with Kosmos 1355. Exploded 12/10/83, 140 pieces
Kosmos 1406	1982 89A	USSR	Sep 8	Plesetsk	A-2	5,900	88.9	213	231	82.3	Reentered 9/21/82: photo recon, maneuvered
PRC 12	1982 90A	PRC	Sep 9	Shuang Cheng Tzu	CZ-2	2,500	90.8	174	385	62.9	Decayed 9/21/82
Kosmos 1407	1982 91A	USSR	Sep 15	Plesetsk	A-2	6,700	89.6	172	340	67.1	Reentered 10/16/82: photo recon, maneuvered
Kosmos 1408	1982 92A	USSR	Sep 16	Plesetsk	F-2	2,200	97.6	626	658	82.6	In orbit: oceanographic, replaced Kosmos 1378
Ekran 9	1982 93A	USSR	Sep 16	Tyuratam	D-1-e	4,000	1,435.8	35,628	35,931	1.7	In orbit: communications
Progress 15	1982 94A	USSR	Sep 18	Tyuratam	A-2	7,020	90.8	302	327	51.6	Reentered 10/16/82: resupply to Salyut 7, docked 9/20/82
Kosmos 1409	1982 95A	USSR	Sep 22	Plesetsk	A-2-e	1,250	717.9	2,035	38,326	64.3	In orbit: early warning, replaced Kosmos 1217; on station 9/28/82

*Weight after apogee kick motor firing

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1410	1982 96A	USSR	Sep 24	Plesetsk	F-2	2,200	115.9	1,494	1,502	82.6	In orbit: communications, phased with Kosmos 1312
Intelsat V F-5	1982 97A	ITSO	Sep 28	ESMC	Atlas-Centaur	2,000	1,436.2	35,766	35,810	0.1	In orbit: provide 12,000 voice circuits and 2 color-TV channels simultaneously
Kosmos 1411	1982 98A	USSR	Sep 30	Plesetsk	A-2	6,300	89.6	229	287	72.8	Reentered 10/14/82: photo recon, maneuvered
Kosmos 1412	1982 99A	USSR	Oct 2	Tyuratam	F-1-m	1,500	103.9	889	997	64.8	In orbit: ocean surveillance, nuclear power supply; paired with Kosmos 1402
Kosmos 1413	1982 100A	USSR	Oct 12	Tyuratam	D-1-e	4,000	673.3	19,068	19,070	64.7	In orbit: navigation, 1st launch of new generation system
Kosmos 1414	1982 100D	USSR	Oct 12	Tyuratam	D-1-e	–	675.7	19,066	19,192	64.7	In orbit: navigation
Kosmos 1415	1982 100E	USSR	Oct 12	Tyuratam	D-1-e	–	673.5	19,070	19,075	64.7	In orbit: navigation
Kosmos 1416	1982 101A	USSR	Oct 14	Tyuratam	A-2	6,300	89.6	232	278	70.3	Reentered 10/28/82: photo recon, maneuvered
Kosmos 1417	1982 102A	USSR	Oct 19	Plesetsk	C-1	810	104.7	955	1,008	83.0	In orbit: navigation, replaced Kosmos 1308
Gorizont 6	1982 103A	USSR	Oct 20	Tyuratam	D-1-e	4,000	1,435.9	35,781	35,784	3.0	In orbit: communications
Kosmos 1418	1982 104A	USSR	Oct 21	Kapustin Yar	C-1	550	92.4	371	414	50.6	Decayed 9/30/83: minor military
RCA Satcom-V	1982 105A	US	Oct 28	ESMC	Delta	589.5	1,436.1	35,781	35,793	0.0	In orbit: provide TV, voice channels, & high speed data to all 50 states & provide cable TV throughout U.S.
DSCS II F-16	1982 106A	US	Oct 30	ESMC	Titan 34D-IUS	–	1,436.1	35,780	35,797	1.5	In orbit. 1st use of IUS
DSCS III F-1	1982 106B	US	Oct 30	ESMC	Titan 34D-IUS	–	1,436.1	35,784	35,789	0.1	In orbit
Progress 16	1982 107A	USSR	Oct 31	Tyuratam	A-2	7,020	91.7	354	362	51.6	Reentered 12/14/82: resupply to Salyut 7, docked 11/2/82
Kosmos 1419	1982 108A	USSR	Nov 2	Tyuratam	A-2	6,300	89.6	230	281	70.3	Reentered 11/16/82: photo recon, maneuvered
Kosmos 1420	1982 109A	USSR	Nov 11	Plesetsk	C-1	750	100.7	779	810	74.0	In orbit: communications, replaced Kosmos 1331
STS-5	1982 110A	US	Nov 11	KSC	Columbia	14,549*	90.3	302	302	28.5	1st operational flight of STS. Crew: Vance Brand, commander; Robert Overmyer, pilot; Joseph Allen, William Lenoir, mission specialists. Launched 2 satellites. Returned 11/16/82 after 5 days, 2 hrs, 14 mns

*Payload weight

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
SBS-3	1982 110B	US	Nov 11	STS-5	PAM-D*	1,117	1,436.1	35,786	35,790	0.0	In orbit: provide all-digital transmission of telephone, computer, electronic mail, video conferencing to Satellite Business System clients
Anik C-3	1982 110C	Canada	Nov 12	STS-5	PAM-D*	632.3	1,436.0	35,778	35,796	0.0	In orbit: Canadian commercial communications (Telesat E)
None	1982 111A	US	Nov 17	–	Titan IIID	–	92.0	268	474	97.0	Decayed 8/13/85
Kosmos 1421	1982 112A	USSR	Nov 18	Tyuratam	A-2	6,300	89.6	230	281	70.3	Reentered 12/2/82: photo recon, maneuvered
Raduga II	1982 113A	USSR	Nov 26	Tyuratam	D-1-e	4,000	1,435.7	35,766	35,793	2.4	In orbit: communications
Kosmos 1422	1982 114A	USSR	Dec 3	Plesetsk	A-2	6,300	89.6	228	288	72.8	Reentered 12/17/82: photo recon, maneuvered
Kosmos 1423	1982 115A	USSR	Dec 8	Tyuratam	A-2-e	6,050	93.7	400	516	62.8	Decayed 1/18/86: communications, intended to replace Molniya 1-48; broke up after launch, 31 pieces
Meteor 2-9	1982 116A	USSR	Dec 14	Plesetsk	A-1	2,750	101.9	810	890	81.2	In orbit: meteorological, possible replacement for Meteor 2-6
Kosmos 1424	1982 117A	USSR	Dec 16	Tyuratam	A-2	6,700	89.7	172	350	64.9	Reentered 1/28/83: photo recon, mameuvered
None	1982 118A	US	Dec 21	WSMC	Atlas E	–	101.2	811	823	98.7	In orbit
Kosmos 1425	1982 119A	USSR	Dec 23	Tyuratam	A-2	6,300	92.1	346	416	69.9	Reentered 1/6/83: photo recon, maneuvered
Raduga	None	USSR	Dec 24	Tyruatam	D-1-e	–	–	–	–	–	2nd stage failure
Kosmos 1426	1982 120A	USSR	Dec 28	Tyuratam	A-2	6,700	90.0	202	356	50.5	Decayed 3/5/83
Kosmos 1427	1982 121A	USSR	Dec 29	Plesetsk	C-1	2,200	93.4	427	455	65.8	In orbit: minor military, possibly related to ASAT calibration
Kosmos 1428	1983 1A	USSR	Jan 12	Plesetsk	C-1	810	104.6	955	1,004	82.9	In orbit: military communications navigation, replaced Kosmos 1333
Kosmos 1429	1983 2A	USSR	Jan 19	Plesetsk	C-1	40	115.8	1,467	1,519	74.0	In orbit: military communications
Kosmos 1430	1983 2B	USSR	Jan 19	Plesetsk	C-1	40	115.6	1,467	1,500	74.0	In orbit: military communications
Kosmos 1431	1983 2C	USSR	Jan 19	Plesetsk	C-1	40	115.4	1,465	1,485	74.0	In orbit: military communications
Kosmos 1432	1983 2D	USSR	Jan 19	Plesetsk	C-1	40	115.2	1,464	1,468	74.0	In orbit: military communications
Kosmos 1433	1983 2E	USSR	Jan 19	Plesetsk	C-1	40	115.0	1,447	1,468	74.0	In orbit: military communications
Kosmos 1434	1983 2F	USSR	Jan 19	Plesetsk	C-1	40	114.8	1,432	1,468	74.0	In orbit: military communications
Kosmos 1435	1983 2G	USSR	Jan 19	Plesetsk	C-1	40	114.7	1,416	1,468	74.0	In orbit: military communications

*Payload Assist Module - Delta Class

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1436	1983 2H	USSR	Jan 19	Plesetsk	C-1	40	114.5	1,400	1,467	74.0	In orbit: communications
Kosmos 1437	1983 3A	USSR	Jan 20	Plesetsk	A-1	2,500	97.5	627	657	81.1	In orbit: elint
IRAS	1983 4A	US	Jan 26	WSMC	Delta	1,073	102.9	890	909	99.1	In orbit: 1st all-sky survey to search for astronomical objects emitting infrared radiation; NASA, Netherlands, UK
Kosmos 1438	1983 5A	USSR	Jan 27	Tyuratam	A-2	6,300	89.6	166	345	70.4	Reentered 2/7/83: photo recon, maneuvered
CS-2A	1983 6A	Japan	Feb 4	Tanega-shima	N-2	772	1,436.2	35,783	35,794	0.4	In orbit: business data, facsimile & video service
Kosmos 1439	1983 7A	USSR	Feb 6	Tyuratam	A-2	–	88.6	168	250	70.3	Reentered 2/22/83: photo recon, maneuvered, earth resources
None	1983 8A	US	Feb 9	WSMC	Atlas F	–	107.4	1,059	1,156	63.4	In orbit
Kosmos 1440	1983 9A	USSR	Feb 10	Plesetsk	A-2	2,500	89.8	259	274	82.3	Reentered 2/24/83: photo recon, maneuvered
Kosmos 1441	1983 10A	USSR	Feb 16	Plesetsk	A-1	2,000	97.3	624	632	81.1	In orbit: elint
Astro-B	1983 11A	Japan	Feb 20	Kagoshima	Mu 3S	185	93.6	456	455	31.5	In orbit: X-ray observation; also known as Tenma
Kosmos 1442	1983 12A	USSR	Feb 25	Plesetsk	A-2	2,500	89.6	171	341	67.1	Reentered 4/11/83: photo recon, maneuvered
Kosmos 1443	1983 13A	USSR	Mar 2	Tyuratam	D-1-h	2,000	91.0	325	327	51.6	Reentered 9/19/83: space station module, mated with Salyut 7; docked 3/10/83. Separated 8/14. Capsule down 8/23
Kosmos 1444	1983 14A	USSR	Mar 2	Plesetsk	A-2	6,300	92.2	356	415	72.8	Reentered 3/16/83: photo recon, maneuvered
Molniya 3-20	1983 15A	USSR	Mar 11	Plesetsk	A-2-e	1,500	718.0	2,066	38,298	63.3	In orbit: communications, replaced Molniya 3-17, on station 4/7/83
Ekran 10	1983 16A	USSR	Mar 12	Tyuratam	D-1-e	4,000	1,515.4	37,139	37,508	4.6	In orbit: communications
Kosmos 1445	1983 17A	USSR	Mar 15	Kapustin Yar	C-1	1,000	88.5	177	224	50.6	Recovered 3/16/83: space plane test, recovered in Indian Ocean
Kosmos 1446	1983 18A	USSR	Mar 16	Tyuratam	A-2	6,300	89.6	226	284	69.9	Reentered 3/30/83: photo recon, maneuvered
Molniya 1-56	1983 19A	USSR	Mar 16	Plesetsk	A-2-e	1,000	720.5	2,382	38,705	63.6	In orbit: communications, replaced Molniya 1-50, on station 3/29/83
Astron	1983 20A	USSR	Mar 23	Tyuratam	D-1-e	3,250	5,915.8	25,128	178,817	79.8	In orbit: scientific Soviet-French astrophysical mission. Spent booster exploded, 16 pieces
Kosmos 1447	1983 21A	USSR	Mar 24	Plesetsk	C-1	810	104.8	959	1,013	82.9	In orbit: navigation, replaced Kosmos 1226; carried COSPAS transponder

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
NOAA 8	1983 22A	US	Mar 28	WSMC	Atlas F	3,775	101.2	803	825	98.7	In orbit: search and rescue/weather/communications and navigation. Battery exploded 12/30/85, 9 fragments
Kosmos 1448	1983 23A	USSR	Mar 30	Plesetsk	C-1	810	104.7	956	1,003	83.0	In orbit: navigation, replaced Kosmos 1344
Kosmos 1449	1983 24A	USSR	Mar 31	Plesetsk	A-2	6,300	92.2	356	415	72.8	Reentered 4/15/83: photo recon, maneuvered
Molniya 1-57	1983 25A	USSR	Apr 2	Tyuratam	A-2-e	1,000	717.6	552	39,795	63.6	In orbit: communications, replaced Molniya 1-52, on station 4/7/83
STS-6	1983 26A	US	Apr 4	KSC	Challenger	21,277*	89.6	284	284	28.0	1st flight of shuttle Challenger; 1st shuttle EVA. Crew: Paul Weitz, commander; Karol Bobko, pilot; Story Musgrave, Donald Peterson, mission specialists. Launched 1 satellite, returned 4/9/83 after 5 days, 23 mns
TDRSS	1983 26B	US	Apr 5	STS-6	IUS	2,268	1,436.4	35,785	35,798	1.4	In orbit: spacecraft-to-ground communications for U.S. launches
Kosmos 1450	1983 27A	USSR	Apr 6	Plesetsk	C-1	–	94.1	450	495	65.9	In orbit: minor military; possibly related to ASAT calibration
Raduga 12	1983 28A	USSR	Apr 8	Tyuratam	D-1-e	–	1,435.5	35,765	35,823	2.1	In orbit: communications
Kosmos 1451	1983 29A	USSR	Apr 8	Plesetsk	A-2	6,300	89.9	226	322	82.3	Reentered 4/22/83: photo recon, maneuvered
RCA Satcom VI	1983 30A	US	Apr 11	ESMC	Delta	2,385	1,436.1	35,775	35,798	0.0	In orbit: 1st completely solid-state domestic communications
Kosmos 1452	1983 31A	USSR	Apr 12	Plesetsk	C-1	750	100.7	781	805	74.0	In orbit: communications, replaced Kosmos 1371
None	1983 32A	US	Apr 15	WSMC	Titan IIIB Agena	–	88.4	135	311	96.5	Decayed 8/21/83
Rohini 3	1983 33A	India	Apr 17	Sriharikota	SLV-3	42	96.4	384	785	46.6	In orbit: Indian earth resources
Kosmos 1453	1983 34A	USSR	Apr 19	Plesetsk	C-1	550	93.8	441	476	74.0	In orbit: minor military
Soyuz T8	1983 35A	USSR	Apr 20	Tyuratam	A-2	6,850	88.5	196	213	51.6	Vladimir Titov, Gennadi Strekalov, Alexander Serebrov failed to dock with Salyut 7. Returned 4/22/83 after 2 days, 20 mns
Kosmos 1454	1983 36A	USSR	Apr 22	Plesetsk	A-2	6,700	89.7	172	351	67.1	Reentered 5/22/83: photo recon, maneuvered
Kosmos 1455	1983 37A	USSR	Apr 23	Plesetsk	F-2	–	97.7	636	663	82.5	In orbit: elint; apparently phased with Kosmos 1470

*Payload weight

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1456	1983 38A	USSR	Apr 25	Plesetsk	A-2-e	1,250	717.5	1,799	38,590	66.5	In orbit: early warning, replaced Kosmos 1191, on station 4/28/83. Exploded 8/12/83, 10 pieces
Kosmos 1457	1983 39A	USSR	Apr 26	Tyuratam	A-2	6,700	89.7	171	348	70.3	Reentered 6/8/83: photo recon, maneuvered
Kosmos 1458	1983 40A	USSR	Apr 28	Plesetsk	A-2	5,900	89.0	212	246	82.3	Reentered 5/11/83: photo recon, maneuvered; earth resources
GOES 6	1983 41A	US	Apr 28	ESMC	Delta	836	1,437.9	35,782	35,864	0.1	In orbit: weather; 3rd in series, NOAA operated
Kosmos 1459	1983 42A	USSR	May 6	Plesetsk	C-1	810	104.7	945	1,017	82.9	In orbit: navigation, replaced Kosmos 1349
Kosmos 1460	1983 43A	USSR	May 6	Tyuratam	A-2	6,300	92.2	350	416	70.3	Reentered 5/20/83: photo recon, maneuvered
Kosmos 1461	1983 44A	USSR	May 7	Tyuratam	F-1-m	1,500	99.3	581	870	65.0	In orbit: ocean surveillance, phased with Kosmos 1507. Exploded 3/11/85
Kosmos 1462	1983 45A	USSR	May 17	Plesetsk	A-2	6,300	89.8	256	276	82.3	Reentered 5/31/83: photo recon, maneuvered; earth resources
Kosmos 1463	1983 46A	USSR	May 19	Plesetsk	C-1	550	102.0	298	1,407	82.9	In orbit: minor military
Intelsat V F-6	1983 47A	ITSO	May 19	ESMC	Atlas-Centaur	1,928	1,436.1	35,765	35,810	0.1	In orbit: communications
Kosmos 1464	1983 48A	USSR	May 24	Plesetsk	C-1	810	104.8	967	1,009	82.9	In orbit: navigation, replaced Kosmos 1295
Kosmos 1465	1983 49A	USSR	May 26	Kapustin Yar	C-1	550	93.5	349	543	50.6	Decayed 1/23/85: minor military
Kosmos 1466	1983 50A	USSR	May 26	Tyuratam	A-2	6,700	89.6	173	344	64.8	Reentered 7/6/83: photo recon, maneuvered
Exosat	1983 51A	ESA	May 26	WSMC	Delta	510	5,429.0	2,919	188,993	71.4	Decayed 5/6/86: X ray studies
Kosmos 1467	1983 52A	USSR	May 31	Plesetsk	A-2	6,300	92.2	357	415	72.8	Reentered 6/12/83: photo recon, maneuvered
Venera 15	1983 53A	USSR	Jun 2	Tyuratam	D-1-e	4,000	Trans-Venus trajectory				In orbit: Venus orbiter; radar mapper; entered 24-hour orbit around Venus 10/10/83
Venera 16	1983 54A	USSR	Jun 7	Tyuratam	D-1-e	4,000	Trans-Venus trajectory				In orbit: Venus orbiter; radar mapper; entered 24-hour orbit around Venus 10/14/83
Kosmos 1468	1983 55A	USSR	Jun 7	Plesetsk	A-2	6,300	89.8	253	278	82.3	Reentered 6/21/83: photo recon, maneuvered
None	1983 56A	US	Jun 9	WSMC	Atlas	–	Elements not available				In orbit
Kosmos 1469	1983 57A	USSR	Jun 14	Plesetsk	A-2	6,300	90.2	194	377	72.8	Reentered 6/24/83: photo recon, maneuvered
ECS-1	1983 58A	ESA	Jun 16	Kourou	Ariane	1,050	1,436.2	35,777	35,803	0.1	In orbit: telephone & TV communications & distribution

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Oscar 10	1983 58B	ESA	Jun 16	Kourou	Ariane	44	699.6	3,990	35,461	27.1	In orbit: West German amateur radio
STS-7	1983 59A	US	Jun 18	KSC	Challenger	16,817*	90.	314	314	28.0	1st 5-person crew including 1st American woman in space. Crew: Commander Robert Crippen; Pilot Frederick Hauck; Mission Specialists Sally Ride, John Fabian & Norman Thagard. Launched 2 satellites, deployed/retrieved 1 payload, returned 6/24/83 after 6 days, 2 hrs, 24 mns
Anik C2	1983 59B	Canada	Jun 18	STS-7	PAM-D	1,238	1,436.1	35,776	35,798	0.0	In orbit: Canadian; also known as Telsat 7
Palapa B-1	1983 59C	Indo	Jun 19	STS-7	PAM-D	1,200	1,436.8	35,677	35,924	1.0	In orbit: Indonesian communications
SPAS	1983 59D	FRG	Jun 20	STS-7	RMS**	1,442	90.0	160	258	96.4	Platform. Deployed, retrieved from shuttle
None	1983 60A	US	Jun 20	WSMC	Titan 34D	32,000	88.3	162	217	96.4	Decayed 3/21/84
Kosmos 1470	1983 61A	USSR	Jun 23	Plesetsk	F-2	–	97.6	676	665	82.5	In orbit: elint; apparently phased with Kosmos 1455
Soyuz T9	1983 62A	USSR	Jun 27	Tyuratam	A-2	6,850	91.1	325	337	51.6	Vladimir Lyakhov, Aleksander Aleksandrov docked w/ Salyut 7, 6/28. Performed 2 spacewalks, returned 11/23/83 after 149 days, 9 hrs 46 mns
None	1983 63A	US	Jun 27	WSMC	Scout	–	101.0	771	837	82.0	In orbit
Kosmos 1471	1983 64A	USSR	Jun 28	Plesetsk	A-2	6,700	89.8	182	351	67.1	Reentered 7/28/83: photo recon, maneuvered
Galaxy 1	1983 65A	US	Jun 28	ESMC	Delta	1,218	1,436.3	35,785	35,798	0.0	In orbit: communications; Hughes TV
Gorizont 7	1983 66A	USSR	Jul 1	Tyuratam	D-1-e	–	1,436.1	35,760	35,811	1.8	In orbit: communications
Prognoz 9	1983 67A	USSR	Jul 1	Tyuratam	A-2-e	1,060	26.7	380	720,000	65.5	In orbit: investigating interplanetary, interstellar space
Kosmos 1472	1983 68A	USSR	Jul 5	Plesetsk	A-2	6,300	91.5	336	361	82.3	Reentered 7/19/83: photo recon, maneuvered; earth resources
Kosmos 1473	1983 69A	USSR	Jul 6	Plesetsk	C-1	40	114.4	1,396	1,462	74.0	In orbit: military communications
Kosmos 1474	1983 69B	USSR	Jul 6	Plesetsk	C-1	40	114.6	1,412	1,463	74.0	In orbit: military communications
Kosmos 1475	1983 69C	USSR	Jul 6	Plesetsk	C-1	40	114.8	1,430	1,463	74.0	In orbit: military communications
Kosmos 1476	1983 69D	USSR	Jul 6	Plesetsk	C-1	40	114.9	1,447	1,463	74.0	In orbit: military communications
Kosmos 1477	1983 69E	USSR	Jul 6	Plesetsk	C-1	40	115.1	1,462	1,466	74.0	In orbit: military communications
Kosmos 1478	1983 69F	USSR	Jul 6	Plesetsk	C-1	40	115.3	1,463	1,483	74.0	In orbit: military communications
Kosmos 1479	1983 69G	USSR	Jul 6	Plesetsk	C-1	40	115.5	1,463	1,501	74.0	In orbit: military communications

*Payload weight
**Remote Manipulator System

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1480	1983 69H	USSR	Jul 6	Plesetsk	C-1	40	115.8	1,463	1,521	74.0	In orbit: military communications
Kosmos 1481	1983 70A	USSR	Jul 8	Plesetsk	A-2-e	1,250	707.3	2,128	37,709	67.2	In orbit: early warning, intended to replace Kosmos 1285; last stage exploded
Kosmos 1482	1983 71A	USSR	Jul 13	Tyuratam	A-2	6,300	92.1	351	412	69.9	Reentered 7/27/83: photo recon, maneuvered; earth resources
None	1983 72A	US	Jul 14	WSMC	Atlas F	–	725.8	19,952	20,798	62.8	In orbit
Molniya 1-58	1983 73A	USSR	Jul 19	Tyuratam	A-2-e	1,000	624.7	393	35,263	64.0	In orbit: communications, replaced Molniya 1-49, on station 7/25/83
Kosmos 1483	1983 74A	USSR	Jul 20	Plesetsk	A-2	6,300	89.8	258	273	82.3	Reentered 6/3/83: photo recon, maneuvered; earth resources
Kosmos 1484	1983 75A	USSR	Jul 24	Tyuratam	A-1	2,500	97.1	588	653	97.9	In orbit: earth resources, follow-on to Meteor-Priroda series
Kosmos 1485	1983 76A	USSR	Jul 26	Plesetsk	A-2	6,300	92.2	356	415	72.8	Reentered 8/9/83: photo recon, maneuvered
Telestar 3A	1983 77A	US	Jul 28	KSC	Delta	1,225	1,436.1	35,778	35,797	0.0	In orbit: AT&T/ commercial communications
None	1983 78A	US	Jul 31	WSMC	Titan IIIB Agena D	Current elements not maintained					In orbit
Kosmos 1486	1983 79A	USSR	Aug 3	Plesetsk	C-1	750	100.7	783	804	74.0	In orbit: communications, replaced Kosmos 1354
Kosmos 1487	1983 80A	USSR	Aug 5	Plesetsk	A-2	6,300	89.8	258	273	82.3	Reentered 8/19/83: photo recon, maneuvered; earth resources
CS-2	1983 81A	Japan	Aug 5	Tanega-shima	N II	670	1,436.1	35,785	35,789	0.0	In orbit: communications, also known as Sakura 2B
Kosmos 1488	1983 82A	USSR	Aug 9	Plesetsk	A-2	6,300	92.2	356	415	72.8	Reentered 8/23/83: photo recon, maneuvered
Kosmos 1489	1983 83A	USSR	Aug 10	Tyuratam	A-2	6,700	89.2	175	301	64.7	Reentered 9/23/83: photo recon, maneuvered
Kosmos 1490	1983 84A	USSR	Aug 10	Tyuratam	D-1-e	–	675.7	19,087	19,171	64.8	In orbit: navigation; 2nd Glonass test flight
Kosmos 1491	1983 84B	USSR	Aug 10	Tyuratam	D-1-e	–	668.4	18,794	19,096	64.7	In orbit: navigation
Kosmos 1492	1983 84C	USSR	Aug 10	Tyuratam	D-1-e	–	676.8	19,153	19,160	64.8	In orbit: navigation
Progress 17	1983 85A	USSR	Aug 17	Tyuratam	A-2	7,020	91.1	320	340	51.6	Reentered 9/18/83: resupply to Salyut 7, docked 8/19/83
PRC 13	1983 86A	PRC	Aug 19	Shuang Cheng Tzu	CZ-2	2,500	88.8	160	266	63.3	Recovered 9/3/83: deployment & recovery techniques; also known as China II
Kosmos 1493	1983 87A	USSR	Aug 23	Plesetsk	A-2	6,300	92.2	359	413	72.8	Reentered 9/6/83: photo recon, maneuvered

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Raduga 13	1983 88A	USSR	Aug 25	Tyuratam	D-1-e	4,000	1,436.4	35,785	35,800	1.6	In orbit: communications
STS-8	1983 89A	US	Aug 30	KSC	Challenger	13,624*	90	307	307	28.0	Crew: Commander Richard Truly; Pilot Daniel Brandenstein; Mission Specialists Guion Bluford, Jr., Dale Gardner, William Thornton. Deployed 1 satellite, tested RMS. Returned 9/5/83 after 6 days, 1 hr, 8 mn
Insat 1B	1983 89B	US	Aug 31	STS-8	PAM-D	1,152	1436.2	35,636	35,939	0.2	In orbit: Indian weather satellite
Molniya 3-21	1983 90A	USSR	Aug 30	Plesetsk	A-2-e	1,500	717.9	1,104	39,253	63.1	In orbit: communications; established new orbital plane, on station 9/5/83
Kosmos 1494	1983 91A	USSR	Aug 31	Kapustin Yar	C-1	550	93.5	345	551	50.6	Decayed 9/26/85: minor military
Kosmos 1495	1983 92A	USSR	Sep 3	Plesetsk	A-2	6,300	88.9	213	235	82.3	Reentered 9/16/83: photo recon, maneuvered
Kosmos 1496	1983 93A	USSR	Sep 7	Plesetsk	A-2	2,500	89.5	173	335	67.1	Reentered 10/19/83: photo recon, maneuvered
RCA Satcom VII	1983 94A	US	Sep 8	ESMC	Delta-PAM-D	1,121	1,436.2	35,782	35,794	0.1	In orbit: RCA commercial communications
Kosmos 1497	1983 95A	USSR	Sep 9	Plesetsk	A-2	6,300	92.2	356	415	72.8	Reentered 9/23/83: photo recon, maneuvered
Kosmos 1498	1983 96A	USSR	Sep 14	Plesetsk	A-2	6,300	89.8	259	273	82.3	Reentered 9/29/83: photo recon, maneuvered; earth resources
Kosmos 1499	1983 97A	USSR	Sep 17	Plesetsk	A-2	6,300	92.2	356	415	72.8	Reentered 10/1/83: photo recon, maneuvered
Galaxy 2	1983 98A	US	Sep 22	ESMC	Delta	1,218	1,436.2	35,783	35,795	0.0	In orbit: communications, Hughes TV
None	None	USSR	Sep 26	Tyuratam	A-2	6,600					Launch pad explosion. Vladimir Titov, Gennadi Strekalov saved by launch escape system, landing 2 miles downrange
Kosmos 1500	1983 99A	USSR	Sep 28	Plesetsk	F-2	–	97.6	627	662	82.5	In orbit: oceanographic & earth resources
Ekran II	1983 100A	USSR	Sep 29	Tyuratam	D-1-e	–	1,435.8	35,779	35,783	1.7	In orbit: communications
Kosmos 1501	1983 101A	USSR	Sep 30	Plesetsk	C-1	–	93.9	442	483	82.9	In orbit: minor military; similar to Kosmos 1311
Kosmos 1502	1983 102A	USSR	Oct 5	Plesetsk	C-1	750	92.3	367	411	65.8	Decayed 8/29/85: minor military; possibly related to ASAT calibration
Kosmos 1503	1983 103A	USSR	Oct 12	Plesetsk	C-1	750	100.8	789	809	74.0	In orbit: communications; replacement for Kosmos 1486

*Payload weight

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1504	1983 104A	USSR	Oct 14	Tyuratam	A-2	6,700	89.2	172	307	64.8	Reentered 12/6/83: photo recon, maneuvered
Intelsat V F-7	1983 105A	ITSO	Oct 19	Kourou	Ariane 1	1,928	1,436.1	35,772	35,803	0.1	In orbit: communications
Progress 18	1983 106A	USSR	Oct 20	Tyuratam	A-2	7,020	91.2	329	346	51.6	Reentered 11/13/83: resupply to Salyut 7; docked 10/22/83
Kosmos 1505	1983 107A	USSR	Oct 21	Plesetsk	A-2	6,300	92.2	357	414	72.8	Reentered 11/4/83: photo recon, maneuvered
Kosmos 1506	1983 108A	USSR	Oct 26	Plesetsk	C-1	810	104.7	951	1,013	82.9	In orbit: navigation; replaced Kosmos 1304
Meteor 2-10	1983 109A	USSR	Oct 28	Plesetsk	A-1	2,750	101.3	752	889	81.1	In orbit: meteorological; phased with Meteor 2-7 and 2-9
Kosmos 1507	1983 110A	USSR	Oct 29	Tyuratam	F-1-m	–	93.2	426	436	65.0	Decayed 8/19/87. Ocean surveillance; phased with Kosmos 1461
Kosmos 1508	1983 111A	USSR	Nov 11	Plesetsk	C-1	550	108.8	394	1,943	82.9	In orbit: minor military
Kosmos 1509	1983 112A	USSR	Nov 17	Plesetsk	A-2	6,300	89.6	226	291	72.8	Reentered 12/3/83: photo recon, maneuvered
None	1983 113A	US	Nov 18	WSMC	Atlas F	–	101.4	815	832	98.7	In orbit
Molniya 1-59	1983 114A	USSR	Nov 23	Plesetsk	A-2-e	1,000	717.8	1,016	39,338	63.1	In orbit: communications; replaced Molniya 1-48, on station 12/10/83
Kosmos 1510	1983 115A	USSR	Nov 24	Plesetsk	F-2	–	116.0	1,480	1,525	73.6	In orbit: geodetic; related to Kosmos 1410 & Kosmos 1312
STS-9	1983 116A	US	Nov 28	KSC	Columbia	15,068*	89.5	250	250	57.0	1st flight of ESA Spacelab. Crew: Commander John Young; Pilot Brewster Shaw, Jr.; Mission Specialists Drs. Owen Garriott, Robert Parker; Payload Specialists Drs. Byron Lichtenberg, Ulf Merbold. Returned 12/8/83 after 10 days,7 hrs, 47 mn
Kosmos 1511	1983 117A	USSR	Nov 30	Plesetsk	A-2	6,700	89.6	171	342	67.1	Reentered 1/13/84: photo recon, maneuvered
Gorizont 8	1983 118A	USSR	Nov 30	Tyuratam	D-1-e	–	1,436.3	35,796	35,783	1.4	In orbit: communications
Kosmos 1512	1983 119A	USSR	Dec 7	Plesetsk	A-2	6,300	92.2	352	419	72.8	Reentered 12/21/83: photo recon, maneuvered
Kosmos 1513	1983 120A	USSR	Dec 8	Plesetsk	C-1	810	104.8	961	1,017	82.9	In orbit: navigation; replaced Kosmos 1417
Kosmos 1514	1983 121A	USSR	Dec 14	Plesetsk	A-2	5,700	89.2	214	259	82.3	Reentered 12/19/83: biosat; international biological flight
Kosmos 1515	1983 122A	USSR	Dec 15	Plesetsk	F-2	–	97.7	637	663	82.5	In orbit: elint; related to Kosmos 1455 and 1470
Molniya 3-22	1983 123A	USSR	Dec 21	Plesetsk	A-2-e	1,500	717.6	623	39,720	64.7	In orbit: communications; replaced Molniya 3-16, on station 12/25/83

*Payload weight

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1516	1983 124A	USSR	Dec 27	Tyuratam	A-2	6,700	89.2	196	276	64.8	Reentered 2/9/84: photo recon, maneuvered
Kosmos 1517	1983 125A	USSR	Dec 27	Kapustin Yar	C-1	1,000	88.5	180	221	50.6	Recovered 12/27/83: space plane test, recovered after 1 revolution
Kosmos 1518	1983 126A	USSR	Dec 28	Plesetsk	A-2-e	1,250	713.9	1,472	38,692	66.5	In orbit: early warning; replaced Kosmos 1341; on station 1/4/84
Kosmos 1519	1983 127A	USSR	Dec 29	Tyuratam	D-1-e	–	675.7	19,107	19,151	65.3	In orbit: navigation; 3rd GLONASS launch
Kosmos 1520	1983 127B	USSR	Dec 29	Tyuratam	D-1-e	–	675.7	19,065	19,193	65.3	In orbit: navigation
Kosmos 1521	1983 127C	USSR	Dec 29	Tyuratam	D-1-e	–	673.4	18,999	19,142	65.3	In orbit: navigation
Kosmos 1522	1984 001A	USSR	Jan 5	Plesetsk	C-I	40	115.4	1,459	1,491	74.0	Tactical communications
Kosmos 1523	1984 001B	USSR	Jan 5	Plesetsk	C-I	40	114.4	1,395	1,459	74.0	Tactical communications
Kosmos 1524	1984 001C	USSR	Jan 5	Plesetsk	C-I	40	114.6	1,410	1,459	74.0	Tactical communications
Kosmos 1525	1984 001D	USSR	Jan 5	Plesetsk	C-I	40	114.7	1,426	1,459	74.0	Tactical communications
Kosmos 1526	1984 001E	USSR	Jan 5	Plesetsk	C-I	40	114.9	1,441	1,459	74.0	Tactical communications
Kosmos 1527	1984 001F	USSR	Jan 5	Plesetsk	C-I	40	115.1	1,457	1,459	74.0	Tactical communications
Kosmos 1528	1984 001G	USSR	Jan 5	Plesetsk	C-I	40	115.3	1,459	1,475	74.0	Tactical communications
Kosmos 1529	1984 001H	USSR	Jan 5	Plesetsk	C-I	40	115.6	1,459	1,510	74.0	Tactical communications
Kosmos 1530	1984 002A	USSR	Jan 11	Plesetsk	A-2	6,300	92.2	356	416	72.8	Military photo recon, recovered 1/25
Kosmos 1531	1984 003A	USSR	Jan 11	Plesetsk	C-I	810	105.0	977	1,009	82.9	Navigation, replaced Kosmos 1386
Kosmos 1532	1984 004A	USSR	Jan 13	Plesetsk	A-2	6,700	89.5	166	359	67.1	Military photo recon, recovered 2/26
BS-2A	1984 005A	Japan	Jan 23	Tanegashima	N-II	670	1,436.3	35,777	35,799	0.0	Direct TV signal broadcasting to remote areas of Japan
Kosmos 1533	1984 006A	USSR	Jan 26	Plesetsk	A-2	6,300	92.1	346	415	70.3	Military photo recon, recovered 2/9
Kosmos 1534	1984 007A	USSR	Jan 26	Plesetsk	C-1	–	94.3	454	501	65.8	Elint
PRC 14	1984 008A	PRC	Jan 29	Xi Chang	CZ-3	900	163.4	467	6,580	36.2	Third stage failure; apogee kick motor fired in low orbit
Unannounced	1984 009A	US	Jan 31	ESMC	Titan 34D	1,043	Elements not available				In orbit

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1535	1984 010A	USSR	Feb 2	Plesetsk	C-1	810	104.8	951	1,015	83.0	Navigation, replaced Kosmos 1428
STS 41B	1984 011A	US	Feb 3	KSC	Challenger	15,342*	90.61	326	329	28.4	Crew: Vance Brand, Robert Gibson, Ronald McNair, Bruce McCandless, Robert Stewart. Launched 2 satellites, tested MMU**, returned 2/11 after 7 days, 23 hours, 16 mns
Westar VI	1984 011B	US	Feb 3	STS	PAM-D	1,200	99.8	303	1,216	27.6	Western Union communications satellite, failed to reach intended orbit, recovered by STS 51-A 11/16
IRT	1984 011C	US	Feb 5	STS	—	91	89.8	269	279	28.4	Integrated Rendezvous Target, disintegrated 2/II
Palapa B2	1984 011D	US	Feb 4	STS	PAM-D	1,200	99.2	277	1,186	28.1	Communications for Indonesian gov't, failed to reach intended orbit, recovered by STS 51-A, 11/16
Unannounced	1984 012A	US	Feb 5	WSMC	Atlas F		Elements not available				In orbit. Three subsatellites
Kosmos 1536	1984 013A	USSR	Feb 8	Plesetsk	F-2	2,200	97.6	629	662	82.4	Elint
Soyuz T-10	1984 014A	USSR	Feb 8	Tyuratam	A-2	6,850	90.3	289	296	51.6	Crew: Leonid Kizim, Vladimir Solovyov, Oleg Atkov. Docked w/ Salyut 7, 2/9. Undocked and reentered (with visiting Soyuz T-11 crew) 4/11. Soyuz T-10 crew returned aboard Soyuz T-11, 10/2
Ohzora (EXOS C)	1984 015A	Japan	Feb 14	Kago-shima	Mu-3S	180	92.8	317	503	74.6	Middle Atmosphere Programmer; optically sensing atmosphere and ionosphere. Decayed 4/20/88
Raduga 14	1984 016A	USSR	Feb 14	Tyuratam	D-1-e	2,000	1,436.5	35,778	35,811	2.3	TV, radio, telegraph communications, positioned above 84 deg. e long.
Kosmos 1537	1984 017A	USSR	Feb 16	Plesetsk	A-2	6,300	89.8	259	273	82.3	Earth resources photo recon, recovered 3/1
Progress 19	1984 018A	USSR	Feb 21	Tyuratam	A-2	7,020	90.1	281	286	51.6	Resupplied Salyut 7, Docked 2/23, undocked 3/31, reentered 4/1
Kosmos 1538	1984 019A	USSR	Feb 21	Plesetsk	C-1	700	100.7	775	807	74.0	Military communications, replaced Kosmos 1420
Kosmos 1539	1984 020A	USSR	Feb 28	Plesetsk	A-2	6,700	90.0	182	374	67.1	Military photo recon, recovered 4/9
Landsat 5	1984 021A	US	Mar 1	WSMC	Delta	1,938	98.8	699	700	98.2	Earth resources remote sensing

*Payload weight

**Manned Maneuvering Unit

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Uosat 2	1984 021B	UK	Mar 1	WSMC	Delta	52	98.4	674	693	98.2	Magnetospheric studies, earth imaging, amateur radio digital communications
Kosmos 1540	1984 022A	USSR	Mar 2	Tyuratam	D-1-e	–	1,436.2	35,782	35,795	3.0	Communications relay, stationed at 79 deg. e long.
Intelsat VA-8	1984 023A	ITSO	Mar 5	Kourou	Ariane 1	1,928	1,436.1	35,769	35,806	0.0	Communications
Kosmos 1541	1984 024A	USSR	Mar 6	Plesetsk	A-2-e	1,250	718.9	1,664	38,744	63.3	Early warning, replaced Kosmos 1278
Kosmos 1542	1984 025A	USSR	Mar 7	Tyuratam	A-2	6,300	92.1	348	414	70.3	Military photo recon, recovered 3/21
Kosmos 1543	1984 026A	USSR	Mar 10	Plesetsk	A-2	5,700	90.6	216	395	62.8	Military photo recon, recovered 4/5
Kosmos 1544	1984 027A	USSR	Mar 15	Plesetsk	F-2	–	97.6	629	660	82.5	Elint
Ekran 12	1984 028A	USSR	Mar 16	Tyuratam	D-1-e	2,000	1,435.7	35,773	35,885	4.4	TV transmission to remote areas, positioned at 99 deg. e long.
Molniya 1-60	1984 029A	USSR	Mar 16	Plesetsk	A-2-e	1,800	717.5	1,105	39,232	64.8	TV, telephone, telegraph communications, replaced Molniya 1-51
Kosmos 1545	1984 030A	USSR	Mar 21	Plesetsk	A-2	6,300	92.2	356	415	72.8	Military photo recon, recovered 4/5
Kosmos 1546	1984 031A	USSR	Mar 29	Tyuratam	D-1-e	–	1,436.1	35,685	35,887	2.1	Communications relay, stationed at 23 deg. w long.
Soyuz T-11	1984 032A	USSR	Apr 3	Tyuratam	A-2	6,850	90.3	287	299	51.6	Crew: Yuri Malyshev, Gennadi Strekalov, Rakesh Sharma; docked w/ Salyut 7 4/4. Crew returned aboard Soyuz T-10, 4/11; Soyuz T-II undocked and reentered w/ T-10 crew, 10/2
Kosmos 1547	1984 033A	USSR	Apr 4	Plesetsk	A-2-e	1,250	718.3	955	38,456	66.5	Early warning, replaced Kosmos 1382
STS 41-C	1984 034A	US	Apr 6	KSC	Challenger	17,334*	91.1	498	498	28.5	Crew: Robert Crippen, Dick Scobee, Terry Hart, George Nelson, James Van Hoften; repaired and redeployed Solar Maximum Satellite, deployed LDEF, returned 4/13 after 6 days, 23 hrs, 40 mns
LDEF	1984 034B	US	Apr 7	STS	RMS**	3,625	94.0	467	470	28.5	Long Duration Exposure Facility; sampling effects of space conditions on electronic systems, scientific packages
PRC 15	1984 035A	PRC	Apr 8	Xi Chang	CZ-3	900	1,436.1	35,776	35,795	1.5	Experimental geosynchronous communications satellite located above 125 deg. e long.

*Payload weight
**Remote Manipulator System

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1548	1984 036A	USSR	Apr 10	Plesetsk	A-2	6,700	89.5	167	333	67.1	Military photo recon, recovered 5/3
Unannounced	1984 037A	US	Apr 15	ESMC	Titan 34D		Elements not available				In orbit
Progress 20	1984 038A	USSR	Apr 15	Tyuratam	A-2	7,020	90.2	280	291	51.6	Resupplied Salyut 7, docked 4/17, undocked 5/6, reentered 5/7
Unannounced	1984 039A	US	Apr 17	WSMC	Titan IIIB-Agena D		88.9	127	235	96.4	Decayed 8/13/84
Kosmos 1549	1984 040A	USSR	Apr 19	Plesetsk	A-2	6,300	92.2	356	415	72.9	Military photo recon, recovered 5/3
Gorizont 9	1984 041A	USSR	Apr 22	Tyuratam	D-1-e	2,000	1,436.2	35,782	35,793	2.0	TV, telephone, telegraph communications, located above 53 deg. e long.
Progress 21	1984 042A	USSR	May 7	Tyuratam	A-2	7,020	90.4	276	317	51.6	Resupplied Salyut 7, docked 5/10, undocked and reentered 5/26
Kosmos 1550	1984 043A	USSR	May 11	Plesetsk	C-1	810	104.9	970	1,010	83.0	Navigation, replaced Kosmos 1535
Kosmos 1551	1984 044A	USSR	May 11	Plesetsk	A-2	6,300	89.2	212	258	72.8	Military photo recon, recovered 5/23
Kosmos 1552	1984 045A	USSR	May 14	Tyuratam	A-2	6,700	89.5	182	322	64.9	Military photo recon, recovered 11/3
Kosmos 1553	1984 046A	USSR	May 17	Plesetsk	C-1	810	104.7	957	1,007	82.9	Navigation, replaced Kosmos 1383
Kosmos 1554	1984 047A	USSR	May 19	Tyuratam	D-1-e	–	675.7	19,090	19,168	65.5	Glonass navigation system
Kosmos 1555	1984 047B	USSR	May 19	Tyuratam	D-1-e	–	675.7	19,104	19,154	65.5	Glonass navigation system
Kosmos 1556	1984 047C	USSR	May 19	Tyuratam	D-1-e	–	676.3	19,130	19,158	65.5	Glonass navigation system
Kosmos 1557	1984 048A	USSR	May 22	Plesetsk	A-2	6,300	89.0	211	247	82.3	Earth resources photo recon, recovered 6/4
Spacenet 1	1984 049A	US/ESA	May 23	Kourou	Ariane 1	705	1,436.2	35,785	35,790	0.0	Communications satellite located above 120 deg. w long.
Kosmos 1558	1984 050A	USSR	May 25	Plesetsk	A-2	6,700	89.6	172	341	67.1	Military photo recon, recovered 7/8
Progress 22	1984 051A	USSR	May 28	Tyuratam	A-2	7,020	91.4	334	358	51.6	Resupplied Salyut 7, docked 5/30, undocked and reentered 7/15
Kosmos 1559	1984 052A	USSR	May 28	Plesetsk	C-1	40	115.7	1,468	1,508	74.0	Military communications
Kosmos 1560	1984 052B	USSR	May 28	Plesetsk	C-1	40	115.5	1,469	1,490	74.0	Military communications
Kosmos 1561	1984 052C	USSR	May 28	Plesetsk	C-1	40	115.4	1,460	1,483	74.0	Military communications
Kosmos 1562	1984 052D	USSR	May 28	Plesetsk	C-1	40	115.2	1,450	1,476	74.0	Military communications
Kosmos 1563	1984 052E	USSR	May 28	Plesetsk	C-1	40	115.0	1,436	1,475	74.0	Military communications

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1564	1984 052F	USSR	May 28	Plesetsk	C-1	40	114.8	1,422	1,474	74.0	Military communications
Kosmos 1565	1984 052G	USSR	May 28	Plesetsk	C-1	40	114.7	1,406	1,474	74.0	Military communications
Kosmos 1566	1984 052H	USSR	May 28	Plesetsk	C-1	40	114.5	1,392	1,473	74.0	Military communications
Kosmos 1567	1984 053A	USSR	May 30	Tyuratam	F-1-m	–	91.8	353	369	65.0	Ocean surveillance. Decayed 4/3/88
Kosmos 1568	1984 054A	USSR	Jun 1	Plesetsk	A-2	6,300	92.2	357	414	72.8	Military photo recon, recovered 6/14
Kosmos 1569	1984 055A	USSR	Jun 6	Plesetsk	A-2-e	1,250	717.8	1,167	38,738	65.7	Early warning, replaced Kosmos 1518
Kosmos 1570	1984 056A	USSR	Jun 8	Plesetsk	C-1	750	100.8	787	807	74.1	Communications, replaced Kosmos 1452
Intelsat VA-9	1984 057A	ITSO	Jun 9	ESMC	Atlas Centaur	1,091	98.5	176	1,215	29.1	Communications, early shutdown of Centaur stage left satellite in incorrect orbit, decayed 10/24
Kosmos 1571	1984 058A	USSR	Jun 11	Tyuratam	A-2	6,300	92.1	348	415	70.0	Military photo recon, recovered 6/26
Navstar 9	1984 059A	US	Jun 13	WSMC	Atlas F	433	718.0	20,127	20,236	62.8	Navigation satellite
Kosmos 1572	1984 060A	USSR	Jun 15	Plesetsk	A-2	6,300	89.8	259	273	82.3	Earth resources photo recon, recovered 6/26
Kosmos 1573	1984 061A	USSR	Jun 19	Plesetsk	A-2	6,300	89.9	229	312	72.8	Military photo recon, recovered 6/28
Kosmos 1574	1984 062A	USSR	Jun 21	Plesetsk	C-1	810	104.8	965	1,005	83.0	Navigation, replaced Kosmos 1339
Raduga 15	1984 063A	USSR	Jun 22	Tyuratam	D-1-e	–	1,436.0	35,776	35,790	1.9	Domestic communications, stationed above 128 deg. e long.
Kosmos 1575	1984 064A	USSR	Jun 22	Plesetsk	A-2	6,300	89.8	258	274	82.3	Earth resources photo recon, recovered 7/7
Unannounced	1984 065A	US	Jun 25	WSMC	Titan 34D	13,300	88.9	170	230	96.1	Decayed 10/18
Kosmos 1576	1984 066A	USSR	Jun 26	Plesetsk	A-2	6,700	89.7	170	351	67.1	Military photo recon, recovered 8/24
Kosmos 1577	1984 067A	USSR	Jun 27	Plesetsk	C-1	810	104.7	955	1,008	83.0	Navigation, replaced Kosmos 1464
Kosmos 1578	1984 068A	USSR	Jun 28	Kapustin Yar	C-1	550	103.2	293	1,525	50.7	Minor military
Kosmos 1579	1984 069A	USSR	Jun 29	Tyuratam	F-1-m	–	103.9	906	979	65.0	Ocean surveillance, placed in storage orbit 9/27
Kosmos 1580	1984 070A	USSR	Jun 29	Plesetsk	A-2	6,300	89.49	228	271	62.8	Photo recon, recovered 7/13
Kosmos 1581	1984 071A	USSR	Jul 3	Plesetsk	A-2-e	1,250	721.1	2,375	38,143	65.2	Early warning, replaced Kosmos 1317
Meteor 2-11	1984 072A	USSR	Jul 5	Plesetsk	F-2	2,750	104.0	939	958	82.5	Meteorological; imaging cloud cover, earth surface

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Soyuz T-12	1984 073A	USSR	Jul 17	Tyuratam	A-2	7,020	91.42	334	354	51.6	Crew: Vladimir Dzhanibekov, Svetlana Savitskaya, Igor Volk; Docked with Salyut 7, 7/18, undocked and reentered 7/29
Kosmos 1582	1984 074A	USSR	Jul 19	Plesetsk	A-2	6,300	89.8	253	280	82.3	Earth resources photo recon, recovered 8/2
Kosmos 1583	1984 075A	USSR	Jul 24	Plesetsk	A-2	6,300	92.2	357	415	72.8	Photo recon, recovered 8/8
Kosmos 1584	1984 076A	USSR	Jul 27	Plesetsk	A-2	6,300	89.9	180	364	82.3	Earth resources photo recon, recovered 8/10
Kosmos 1585	1984 077A	USSR	Jul 31	Tyuratam	A-2	6,700	89.2	174	302	64.7	Military photo recon, recovered 9/28
Gorizont 10	1984 078A	USSR	Aug 1	Tyuratam	D-1-e	2,000	1,436.2	35,776	35,800	1.6	TV, telephone, telegraph communications, positioned above 80 deg. e long.
Kosmos 1586	1984 079A	USSR	Aug 2	Plesetsk	A-2-e	2,000	718.0	1,451	38,914	64.2	Early warning, replaced Kosmos 1456
GMS 3 (Himawari 3)	1984 080A	Japan	Aug 2	Tanega-shima	N-II	303	1,436.0	35,783	35,787	0.8	Meteorological imaging, also studying protons, electrons, alpha particles in satellite region; positioned above 140 deg. e long.
ECS 2	1984 081A	ESA	Aug 4	Kourou	Ariane 3	700	1,436.1	35,771	35,802	0.1	TV, telephone communications, positioned above 7 deg. e long.
Telecom 1A	1984 081B	France	Aug 4	Kourou	Ariane 3	690	1,436.2	35,749	35,827	0.0	Domestic and military communications, positioned above 8 deg. w long.
Kosmos 1587	1984 082A	USSR	Aug 6	Plesetsk	A-2	6,300	90.1	197	368	72.8	Military photo recon, maneuvered 8/18, recovered 8/31
Kosmos 1588	1984 083A	USSR	Aug 7	Tyuratam	F-1-m	–	93.1	410	439	65.0	Ocean surveillance. Decayed 2/17/88. Exploded 2/23/86, 46 pieces
Kosmos 1589	1984 084A	USSR	Aug 8	Plesetsk	F-2	–	115.9	1,491	1,499	82.6	Geodetic
Molniya 1-61	1984 085A	USSR	Aug 10	Plesetsk	A-2-e	1,800	717.7	1,125	39,227	63.1	TV, telephone, telegraph communications, replaced Molniya 1-53
Progress 23	1984 086A	USSR	Aug 14	Tyuratam	A-2	7,020	91.6	341	369	51.6	Resupplied Salyut 7, docked 8/16, undocked 8/26, reentered 8/28
Kosmos 1590	1984 087A	USSR	Aug 16	Plesetsk	A-2	6,300	89.8	261	270	82.3	Earth resources photo recon, recovered 8/30
CCE (Ampte 1)	1984 088A	US	Aug 16	ESMC	Delta	242	939.4	974	49,817	3.8	Charge Composition Explorer, detects tracer ions released into magnetosphere by IRM satellite
IRM (Ampte 2)	1984 088B	FRG	Aug 16	ESMC	Delta	605	2,653.4	402	113,818	27.0	Releases lithium, barium ions which interact with magneto-sphere and are detected by US and UK Ampte satellites

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
UKS (Ampte 3)	1984 088C	UK	Aug 16	ESMC	Delta	77	2,659.6	1,002	113,417	26.9	Measures disturbances in magnetosphere caused by ions released from Ampte 2
Molniya 1-62	1984 089A	USSR	Aug 24	Plesetsk	A-2-e	1,800	717.9	1,514	38,845	63.7	TV, telephone, telegraph communications, replaced Molniya 1-54
Ekran 13	1984 090A	USSR	Aug 24	Tyuratam	D-1-e	2,000	1,435.7	30,376	41,180	2.0	TV transmission to remote areas, located above 99 deg. e long.
Unannounced	1984 91A	US	Aug 28	WSMC	Titan IIIB	—	Elements not available				In orbit
Kosmos 1591	1984 092A	USSR	Aug 30	Plesetsk	A-2	6,300	89.8	259	272	82.3	Earth resources photo recon, recovered 9/13
STS 41-D	1984 093A	US	Aug 30	KSC	Discovery	21,524*	90.4	331	331	28.4	Crew: Henry Hartsfield, Michael Coats, Steven Hawley, Richard Mullane, Judith Resnik, Charles Walker; Launched 3 satellites, tested solar array, returned 9/5 after 6 days, 56 mns
SBS 4	1984 093B	US	Aug 31	STS	PAM-D	1,117	1,436.2	35,784	35,795	0.0	Commercial communications, positioned above 101 deg. w long.
Leasat 1 (Syncom IV-2)	1984 093C	US	Aug 31	STS	PKM**	1,315†	1,436.0	35,783	35,791	0.7	Military communications, located above 105 deg. w long.
Telstar 3C	1984 093D	US	Sep 1	STS	PAM-D	1,225	1,426.1	35,782	35,791	0.0	Communications, stationed above 125 deg. w long.
Kosmos 1592	1984 094A	USSR	Sep 4	Plesetsk	A-2	6,000	89.7	233	295	72.8	Military photo recon, recovered 9/18
Kosmos 1593	1984 095A	USSR	Sep 4	Tyuratam	D-1-e	700	675.7	19,091	19,167	64.8	Glonass navigation system
Kosmos 1594	1984 095B	USSR	Sep 4	Tyuratam	D-1-e	700	677.2	19,139	19,193	64.7	Glonass navigation system
Kosmos 1595	1984 095C	USSR	Sep 4	Tyuratam	D-1-e	700	675.7	19,086	19,172	64.7	Glonass navigation system
Kosmos 1596	1984 096A	USSR	Sep 7	Plesetsk	A-2-e	2,000	717.7	2,426	37,924	63.8	Early warning, replaced Kosmos 1348
Navstar 10	1984 097A	US	Sep 8	WSMC	Atlas F	770	718.8	19,950	20,411	63.5	Navigation
PRC 16	1984 098A	PRC	Sep 12	Shuang Cheng tzu	CZ-2	2,500	90.2	174	400	67.9	Photo recon, recovered 9/29
Kosmos 1597	1984 099A	USSR	Sep 13	Plesetsk	A-2	5,900	89.0	211	244	82.3	Earth resources photo recon, recovered 9/26
Kosmos 1598	1984 100A	USSR	Sep 13	Plesetsk	C-1	810	104.9	964	1,015	82.9	Navigation, replaced Kosmos 1550

*Payload weight
**Perigee Kick Motor
†When fuel is depleted

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Galaxy 3	1984 101A	US	Sep 21	ESMC	Delta	1,218	1,436.2	35,782	35,793	0.0	Commercial communications, positioned above 93.5 deg. w long.
Kosmos 1599	1984 102A	USSR	Sep 25	Plesetsk	A-2	6,700	89.4	179	319	67.1	Photo recon, recovered 11/20
Kosmos 1600	1984 103A	USSR	Sep 27	Tyuratam	A-2	6,300	92.2	349	418	69.9	Photo recon, recovered 10/11
Kosmos 1601	1984 104A	USSR	Sep 27	Tyuratam	C-1	–	94.2	460	501	65.8	Minor military
Kosmos 1602	1984 105A	USSR	Sep 28	Plesetsk	F-2	2,000	97.7	629	664	82.5	Remote ocean sensing
Kosmos 1603	1984 106A	USSR	Sep 28	Tyuratam	D-1-e	–	101.9	836	864	71.0	Maneuvered 3 times; possible launch vehicle propulsion test
Kosmos 1604	1984 107A	USSR	Oct 4	Plesetsk	A-2-e	2,500	718.0	2,456	37,909	63.2	Early warning, replaced Kosmos 1367
STS 41-G	1984 108A	US	Oct 5	KSC	Challenger	10,629*	91.5	352	352	57.0	Crew: Robert Crippen, Jon McBride, David Leestma, Kathryn Sullivan, Sally Ride, Paul Scully-Power, Marc Garneau; performed high resolution terrain imagery, launched 1 satellite, first EVA by U.S. woman astronaut, returned 10/13 after 8 days, 5 hrs, 23 mns
ERBS	1984 108B	US	Oct 5	STS	RMS**	226	96.8	601	605	57.0	Earth Radiation Budget Satellite, studying solar radiation energy
Kosmos 1605	1984 109A	USSR	Oct 11	Plesetsk	C-1	810	104.7	947	1,017	82.9	Navigation, replaced Kosmos 1459
Nova 3	1984 110A	US	Oct 12	WSMC	Scout	165	108.9	1,150	1,198	90.1	Navigation
Kosmos 1606	1984 111A	USSR	Oct 18	Plesetsk	F-2	2,000	97.6	628	661	82.5	Elint, replaced Kosmos 1455
Kosmos 1607	1984 112A	USSR	Oct 31	Tyuratam	F-1	–	104.1	907	995	65.0	Military ocean surveillance
STS 51-A	1984 113A	US	Nov 8	KSC	Discovery	20,523*	91.5	361	361	28.4	Crew: Frederick Hauck, David Walker, Anna Fisher, Joseph Allen, Dale Gardner; Recovered Westar VI, Palapa B2, launched 2 satellites, returned 11/12 after 7 days, 23 hrs, 45 mns
Anik D-2	1984 113B	Canada	Nov 9	STS	PAM-D	1,100	1,436.1	35,779	35,795	0.0	Domestic communications, located above 111.5 deg. w long.

*Payload weight
**Remote Manipulator System

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Leasat 2 (Syncom IV-1)	1984 113C	US	Nov 10	STS	PKM*	1,315**	1,436.0	35,679	35,890	0.9	Military communications, positioned above 105 deg. w long.
Spacenet 2	1984 114A	US	Nov 10	Kourou	Ariane 3	705	1,436.2	35,780	35,795	0.0	Commercial communications, stationed above 68 deg. w long.
Marecs B2	1984 114B	ESA	Nov 10	Kourou	Ariane 3	563	1,436.2	35,799	35,799	2.0	Maritime communications, positioned above 177.5 deg. e long.
Nato 3D	1984 115A	NATO	Nov 14	ESMC	Delta	320	1,436.1	35,785	35,795	3.2	Military communications, located above 138 deg. w long.
Kosmos 1608	1984 116A	USSR	Nov 14	Tyuratam	A-2	6,700	88.9	197	251	69.9	Military photo recon, recovered 12/17
Kosmos 1609	1984 117A	USSR	Nov 14	Plesetsk	A-2	6,300	92.2	356	414	72.8	Military photo recon, recovered 11/28
Kosmos 1610	1984 118A	USSR	Nov 15	Plesetsk	C-1	810	104.9	964	1,010	82.9	Navigation, replaced Kosmos 1531
Kosmos 1611	1984 119A	USSR	Nov 21	Tyuratam	A-2	6,700	89.7	173	351	64.7	Military photo recon, recovered or decayed 1/11/85
Kosmos 1612	1984 120A	USSR	Nov 27	Plesetsk	F-2	2,200	98.4	135	1,230	82.6	Launch vehicle failed to shut down at perigee, casting spacecraft into unusable orbit. Decayed 1/31/85
Kosmos 1613	1984 121A	USSR	Nov 29	Plesetsk	A-2	6,300	90.0	197	356	72.8	Military photo recon, recovered 12/24
Unannounced	1984 122A	US	Dec 4	WSMC	Titan 34D	13,000	Elements not available				In orbit
NOAA 9	1984 123A	US	Dec 12	WSMC	Atlas	1,712	102.0	841	862	99.0	Meteorological, polar orbit
Molniya 1-63	1984 124A	USSR	Dec 14	Plesetsk	A-2-e	1,800	717.8	1,997	38,358	63.2	TV, telephone, telegraph communications, replaced Molniya 1-55
Vega 1	1984 125A	USSR	Dec 15	Tyuratam	D-1-e	4,000	Heliocentric orbit				Joint mission to Venus/Comet Halley. Reached Venus, 6/10/85, deployed lander/atmospheric balloon; Comet Halley rendezvous 3/6/86
Kosmos 1614	1984 126A	USSR	Dec 19	Kapustin Yar	C-1	1,000	88.4	176	223	50.6	Space plane recovery test, landed in Black Sea after 1 orbit
Kosmos 1615	1984 127A	USSR	Dec 20	Plesetsk	C-1	–	94.0	436	481	65.8	Minor military
Vega 2	1984 128A	USSR	Dec 21	Tyuratam	D-1-e	4,000	Heliocentric orbit				Joint Venus/Comet Halley probe. Reached Venus 6/14/85, ejected Lander/atmospheric balloon; Comet Halley rendezvous 3/9/86
Unannounced	1984 129A	US	Dec 22	ESMC	Titan 34D	–	Elements not available				In orbit

*Perigee Kick Motor

**When fuel is depleted

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Sakigake (M5-T5)	1985 01A	Japan	Jan 7	Kagoshima	Mu-3S	141	Heliocentric Orbit				Rendezvoused with Comet Halley 3/86
Kosmos 1616	1985 02A	USSR	Jan 9	Tyuratam	A-2	6,700	89.9	172	358	64.8	Military photo recon. Decayed 3/4
Kosmos 1617	1985 03A	USSR	Jan 15	Plesetsk	F-2	40	114.0	1,410	1,412	82.6	Kosmos 1617-1622 new satellite series, mission unknown
Kosmos 1618	1985 03B	USSR	Jan 15	Plesetsk	F-2	40	114.0	1,405	1,411	82.6	
Kosmos 1619	1985 03C	USSR	Jan 15	Plesetsk	F-2	40	113.7	1,381	1,410	82.6	
Kosmos 1620	1985 03D	USSR	Jan 15	Plesetsk	F-2	40	113.8	1,388	1,410	82.6	
Kosmos 1621	1985 03E	USSR	Jan 15	Plesetsk	F-2	40	113.8	1,393	1,410	82.6	
Kosmos 1622	1985 03F	USSR	Jan 15	Plesetsk	F-2	40	113.9	1,398	1,411	82.6	
Molniya 3-23	1985 04A	USSR	Jan 16	Plesetsk	A-2-e	1,800	717.8	399	39,957	64.6	TV, telephone, telegraph communications, replaced Molniya 3-19
Kosmos 1623	1985 05A	USSR	Jan 16	Tyuratam	A-2	6,300	92.2	332	427	70.0	Military photo recon, recovered 1/30
Kosmos 1624	1985 06A	USSR	Jan 17	Plesetsk	C-1	700	100.7	782	804	74.0	Military communications; replaced Kosmos 1570
Gorizont 11	1985 07A	USSR	Jan 18	Tyuratam	D-1-e	2,000	1,436.1	35,767	35,807	1.2	TV, telephone, telegraph comm, positioned above 140 deg. e long.
Kosmos 1625	1985 08A	USSR	Jan 23	Tyuratam	F-I	–	89.3	111	368	65.0	Ocean surveillance; decayed 1/25
Kosmos 1626	1985 09A	USSR	Jan 24	Plesetsk	F-2	2,200	97.6	626	661	82.5	Elint; replaced Kosmos 1408
STS-51C	1985 010A	US	Jan 24	KSC	Discovery	–	91.3	341	341	28.4	Crew: Thomas Mattingly, Loren Shriver, Ellison Onizuka, James Buchli, Gary Payton. Launched military payload; returned 1/27 after 3 days, 1 hr, 33 mns.
Unannounced	1985 010B	US	Jan 24	STS	IUS		Elements not available				In orbit
Kosmos 1627	1985 011A	USSR	Feb 1	Plesetsk	C-I	810	104.8	952	1,017	82.9	Navigation; replaced Kosmos 1448
Kosmos 1628	1985 012A	USSR	Feb 6	Plesetsk	A-2	6,300	92.3	355	415	72.8	Military photo recon, recovered 2/20
Meteor 2-12	1985 013A	USSR	Feb 6	Plestesk	F-2	2,200	104.0	934	960	82.5	Meteorological; remote sensing
Unannounced	1985 014A	US	Feb 8	WSMC	Titan IIIB	–	Elements not available				In orbit
Arabsat 1	1985 015A	SA	Feb 8	Kourou	Ariane 3	532	1436.1	35,753	35,819	0.1	Communications coverage for North Africa, Middle East; located above 19 deg. e long.

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Brasilsat 1	1985 015B	Brazil	Feb 8	Kourou	Ariane 3	671	1436.2	35,787	35,790	0.1	Domestic communications; stationed above 65 deg. w long.
Kosmos 1629	1985 016A	USSR	Feb 21	Tyuratam	D-1-e	–	1437.7	35,806	35,827	1.3	Developmental military communications (?), stationed above 335 deg. e long.
Kosmos 1630	1985 017A	USSR	Feb 27	Tyuratam	A-2	6,700	89.6	174	334	64.8	Military photo recon, maneuverable, recovered 4/23
Kosmos 1631	1985 018A	USSR	Feb 27	Plesetsk	C-I	–	94.4	472	495	65.9	Radar calibration (?)
Kosmos 1632	1985 019A	USSR	Mar 1	Plesetsk	A-2	6,300	89.3	211	268	72.8	Military photo recon; maneuvered extensively; recovered 3/15
Kosmos 1633	1985 020A	USSR	Mar 5	Plesetsk	F-2	2,200	97.6	631	656	82.5	Elint; replaced Kosmos 1470
Geosat	1985 021A	US	Mar 13	ESMC	Atlas F	635	100.5	782	786	108.0	Ocean mapping, replaces data lost due to premature shutdown of Seasat
Kosmos 1634	1985 022A	USSR	Mar 14	Plesetsk	C-I	810	104.8	957	1,008	82.9	Navigation; replaced Kosmos 1513
Kosmos 1635	1985 023A	USSR	Mar 21	Plesetsk	C-I	40	115.8	1,471	1,511	74.1	Tactical communications
Kosmos 1636	1985 023B	USSR	Mar 21	Plesetsk	C-I	40	115.6	1,472	1,493	74.1	Tactical communications
Kosmos 1637	1985 023C	USSR	Mar 21	Plesetsk	C-I	40	115.4	1,463	1,486	74.1	Tactical communications
Kosmos 1638	1985 023D	USSR	Mar 21	Plesetsk	C-I	40	115.2	1,454	1,478	74.1	Tactical communications
Kosmos 1639	1985 023E	USSR	Mar 21	Plesetsk	C-I	40	115.1	1,439	1,478	74.1	Tactical communications
Kosmos 1640	1985 023F	USSR	Mar 21	Plesetsk	C-I	40	114.9	1,425	1,477	74.1	Tactical communications
Kosmos 1641	1985 023G	USSR	Mar 21	Plesetsk	C-I	40	114.8	1,410	1,478	74.1	Tactical communications
Kosmos 1642	1985 023H	USSR	Mar 21	Plesetsk	C-I	40	114.6	1,397	1,476	74.1	Tactical communications
Ekran 14	1985 024A	USSR	Mar 22	Tyuratam	D-1-e	2,000	1,479.0	30,642	42,600	0.4	TV transmission to remote areas, located above 99 deg. e long.
Intelsat VA-10	1985 025A	ITSO	Mar 22	ESMC	Altas Centaur	2,013	1,436.2	35,767	35,812	0.0	Communications, in geosynchronous orbit above the Atlantic
Kosmos 1643	1985 026A	USSR	Mar 25	Tyuratam	A-2	6,700	89.2	212	252	64.7	Military photo recon, maneuverable, recovered 10/18
Kosmos 1644	1985 027A	USSR	Apr 3	Tyuratam	A-2	6,300	92.2	349	415	70.3	Military photo recon, recovered 4/17

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
STS 51-D	1985 028A	US	Apr 12	KSC	Discovery	16,228*	92.1	463	463	28.5	Crew: Karol Bobko, Donald Williams, Rhea Seddon, S. David Griggs, Jeffrey A. Hoffman, Senator Jake Garn, Charles D. Walker. Launched two satellites; landed 4/19, after 6 days, 23 hrs, 56 mns.
Anik C-1	1985 028B	Canada	Apr 13	STS	PAM-D	1,238	1436.0	35,777	35,798	0.3	Last in series of 3 communications satellites for Telesat Canada; placed in storage orbit at 107.5 deg. w long.
Leasat 3 (Syncom IV-3)	1985 028C	US	Apr 13	STS	PKM**	1,315†	1,436.2	35,768	35,809	1.4	Military communications. Stranded in low-earth orbit when PKM failed to fire after deployment; Repaired on orbit 8/31-9/1; PKM fired 10/27. Operational above 178 deg. e long.
None	None	USSR	Apr 13	Tyuratam	SL-16††	–	–	–	–	–	1st launch. No orbit
Kosmos 1645	1985 029A	USSR	Apr 16	Plesetsk	A-2	5,700	90.5	390	215	62.8	Scientific experiments; recovered 4/29
Kosmos 1646	1985 030A	USSR	Apr 18	Tyuratam	F-l-m	–	92.3	378	399	65.0	Ocean surveillance
Kosmos 1647	1985 031A	USSR	Apr 19	Plesetsk	A-2	6,700	89.4	161	327	67.1	Military photo recon, recovered 6/II
Kosmos 1648	1985 032A	USSR	Apr 25	Plesetsk	A-2	6,300	90.1	229	327	82.3	Photo recon, recovered 5/6
Prognoz 10	1985 033A	USSR	Apr 26	Tyuratam	A-2-e	1,000	5,783	5,095	194,734	76.8	Soviet/Czech mission studying magnetosphere and solar wind
STS 51-B	1985 034A	US	Apr 29	KSC	Challenger	14,227*	91.5	352	352	57.0	Crew: Robert Overmyer, Frederick Gregory, Don Lind, William Thornton, Taylor Wang, Norman Thagard, Lodewijk van den Berg. Carried Spacelab 3, one subsatellite deployed. Landed 5/6 after 7 days, 9 mns.
Nusat	1985 034B	US	Apr 29	STS	–	52	91.1	318	339	57.0	Air traffic control radar calibration. Decayed 12/15/86
GSTAR-1	1985 035A	US	May 8	Kourou	Ariane 3	705	1436.2	35,778	35,799	0.0	U.S. domestic communications; stationed above 103 deg. w long.
Telecom 1B	1985 035B	France	May 8	Kourou	Ariane 3	690	1436.2	35,771	35,804	0.1	French business communications satellite positioned above 5 deg. w long.
Kosmos 1649	1985 036A	USSR	May 15	Plesetsk	A-2	6,300	92.3	356	415	72.8	Military photo recon; recovered 5/29

*Payload weight
**Perigee Kick Motor
†When fuel is depleted
††DoD designation (J-1, Sheldon system)

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1650	1985 037A	USSR	May 17	Tyuratam	D-1-e	600	675.7	19,084	19,174	64.8	Glonass nagivation system
Kosmos 1651	1985 037B	USSR	May 17	Tyuratam	D-1-e	600	675.7	19,118	19,140	64.8	Glonass navigation system
Kosmos 1652	1985 037C	USSR	May 17	Tyuratam	D-1-e	600	675.8	19,117	19,147	64.8	Glonass navigation system
Kosmos 1653	1985 038A	USSR	May 22	Plesetsk	A-2	6,300	89.5	209	294	82.3	Earth resources photo recon, recovered 6/5
Kosmos 1654	1985 039A	USSR	May 23	Tyuratam	A-2	6,700	89.6	172	343	64.8	Military photo recon, disintegrated 6/21, 19 pieces
Molniya 3-24	1985 040A	USSR	May 29	Plesetsk	A-2-e	1,800	717.6	1,822	38,523	63.1	Domestic communications; replaced Molniya 3-18
Kosmos 1655	1985 041A	USSR	May 30	Plesetsk	C-I	810	105.0	973	1,015	83.0	Navigation; replaced Kosmos 1447
Kosmos 1656	1985 042A	USSR	May 30	Tyuratam	D-1-e	–	101.5	803	859	71.1	Elint; maneuvered; new satellite system formation?
Soyuz T-13	1985 043A	USSR	Jun 6	Tyuratam	A-2	6,850	91.6	356	359	51.6	Crew: Vladimir Dzhanibekov, Viktor Savinykh. Docked w/ inert Salyut 7,6/8; Cosmonauts resurrected station. T-13 returned 9/25 w/ Dzhanibekov and Georgi Grechko (Soyuz T-14), marking 1st crew rotation in space.
Kosmos 1657	1985 044A	USSR	Jun 7	Plesetsk	A-2	6,300	89.2	182	284	82.2	Earth resources photo recon, recovered 6/21
Kosmos 1658	1985 045A	USSR	Jun 11	Plesetsk	A-2-e	1,250	718.9	1,230	39,182	63.7	Early warning; replaced Kosmos 1481
Kosmos 1659	1985 046A	USSR	Jun 13	Plesetsk	A-2	6,300	92.3	357	415	72.9	Military photo recon, recovered 6/27
Kosmos 1660	1985 047A	USSR	Jun 14	Plesetsk	F-2	600	116.0	1,480	1,523	73.6	Geodetic
STS 51-G	1985 048A	US	Jun 17	KSC	Discovery	20,148*	91.8	383	383	28.4	Crew: Daniel Brandenstein, John Creighton, John Fabian, Shannon Lucid, Stephen Nagel, Patrick Baudry, Sultan Salman Abdelazizi Al-Saud. Launched 3 satellites, 1 research platform; carried French biomedical experiments; returned 6/24 after 7 days 1 hr, 39 mns.
Morelos 1	1985 048B	Mexico	Jun 17	STS	PAM-D	512	1,436.1	35,776	35,798	0.0	Domestic communications, positioned above 113.5 deg. w long.
Arabsat 1B	1985 048C	SA	Jun 18	STS	PAM-D	592	1,436.2	35,768	35,807	0.0	Communicatio ns coverage for North Africa, Middle East, located above 26 deg. e long.
Telstar 3D	1985 048D	US	Jun 19	STS	PAM-D	630	1,436.1	35,770	35,804	0.0	Commercial comm, located above 76 deg. w long.

*Payload weight

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Spartan 1	1985 048E	US	Jun 20	STS	RMS*	1,008	91.82	355	391	28.4	Astronomical research platform, short-term free-flier. Retrieved 6/22
Kosmos 1661	1985 049A	USSR	Jun 18	Plesetsk	A-2-e	1,250	718.2	2,126	38,248	63.1	Early warning; maneuverable
Kosmos 1662	1985 050A	USSR	Jun 19	Plesetsk	C-I	–	94.3	465	500	65.8	Minor military
Progress 24	1985 051A	USSR	Jun 21	Tyuratam	A-2	7,020	91.6	354	360	51.6	Resupplied Salyut 7; docked 6/23; undocked and reentered 7/15
Kosmos 1663	1985 052A	USSR	Jun 21	Plesetsk	A-2	6,300	89.8	257	274	82.3	Earth resources photo recon; recovered 7/5
Unannounced	1985 053A	USSR	Jun 21	Tyuratam	SL-16**	–	89.8	195	340	64.4	Payload failed to orbit; debris decayed w/in 7 days; no U.N. registration. New launch vehicle
Kosmos 1664	1985 054A	USSR	Jun 26	Plesetsk	A-2	6,300	89.34	211	268	72.8	Military photo recon, maneuvered, decayed 7/5
Intelsat VA-11	1985 055A	ITSO	Jun 30	EMSC	Atlas Centaur	1,098	1,436.2	35,771	35,805	0.0	Communications. In geosynchronous orbit over Indian Ocean
Giotto	1985 056A	ESA	Jul 2	Kourou	Ariane 1	512	Heliocentric orbit				Scientific satellite; rendezvoused w/ Comet Halley 3/13/86
Kosmos 1665	1985 057A	USSR	Jul 3	Plesetsk	A-2	6,300	89.7	225	290	72.8	Military photo recon, recovered 7/17
Kosmos 1666	1985 058A	USSR	Jul 8	Plesetsk	F-2	1,500	97.7	628	664	82.5	Elint
Kosmos 1667	1985 059A	USSR	Jul 10	Plesetsk	A-2	5,700	89.3	211	270	82.3	Biological research, carried 2 monkeys, recovered 7/17
Kosmos 1668	1985 060A	USSR	Jul 15	Tyuratam	A-2	6,300	89.6	230	281	70.3	Military photo recon, recovered 7/29
Molniya 3-25	1985 061A	USSR	Jul 17	Plesetsk	A-2-e	1,800	717.8	1,238	39,114	62.9	TV, telephone, telegraph communications
Kosmos 1669	1985 062A	USSR	Jul 19	Tyuratam	A-2	7,020	91.0	298	358	51.6	Test flight of new modified Progress vehicle; resupplied Salyut 7; docked 7/21; undocked 8/29, reentered 8/30
STS 51-F	1985 063A	US	Jul 29	KSC	Challenger	15,583†	90.9	322	322	49.4	Crew: Gordon Fullerton, Roy Bridges, Karl Henize, F. Story Musgrave, Anthony England, Loren Acton, John-David Bartoe; Carried Spacelab 2, deployed 1 subsatellite; returned 8/6 after 7 days, 22 hrs, 46 mns.

*Remote Manipulator System
**DoD designation. (J-1 Sheldon system)
†Payload weight

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
PDP	1985 063B	US	Aug 1	STS	RMS*	285	90.9	312	321	49.4	Plasma Diagnostics Package. Flew alongside shuttle for few hours, retrieved 8/2. Other experiments conducted while attached to RMS
Kosmos 1670	1985 064A	USSR	Aug 1	Tyuratam	F-1-m	4,540	104.1	897	1,006	65.0	Nuclear powered recon; in storage orbit
Kosmos 1671	1985 065A	USSR	Aug 2	Plesetsk	A-2	6,300	89.4	228	258	/2.8	Military photo recon, recovered 8/16
Transit 19 (Oscar 24)	1985 066A	US	Aug 3	WSMC	Scout	55	107.9	1,001	1,259	89.8	Navigation
Transit 20 (Oscar 30)	1985 066B	US	Aug 3	WSMC	Scout	55	107.9	1,000	1,260	89.8	Navigation
Kosmos 1672	1985 067A	USSR	Aug 7	Plesetsk	A-2	6,300	89.8	258	273	82.3	Earth resources photo recon, maneuvered, recovered 8/21
Kosmos 1673	1985 068A	USSR	Aug 8	Tyuratam	A-2	6,700	89.1	202	261	64.8	Military photo recon, recovered 9/19
Kosmos 1674	1985 069A	USSR	Aug 8	Plesetsk	F-2	1,500	97.6	627	660	82.5	Elint; replaced Kosmos 1536
Raduga 16	1985 070A	USSR	Aug 8	Tyuratam	D-1-e	2,000	1,435.9	35,765	35,801	0.9	Domestic communications, positioned above 45 deg. e long.
Kosmos 1675	1985 071A	USSR	Aug 12	Plesetsk	A-2-e	1,250	717.7	1,371	38,977	65.0	Early warning; replaced Kosmos 1581
Kosmos 1676	1985 072A	USSR	Aug 16	Plesetsk	A-2	6,300	89.5	178	317	67.2	Military photo recon, maneuverable, recovered 10/14
Planet A (Suisei)	1985 073A	Japan	Aug 18	Kagoshima	Mu-3SII	141		Heliocentric orbit			Rendezvoused w/ Comet Halley 3/8/86
Molniya 1-64	1985 074A	USSR	Aug 22	Plesetsk	A-2-e	1,800	717.8	979	39,374	63.2	Communications; replaced Molniya 1-61
Kosmos 1677	1985 075A	USSR	Aug 23	Tyuratam	F-1-m	4,540	103.9	891	992	64.7	Nuclear powered ocean surveillance; in storage orbit
STS 51-I	1985 076A	US	Aug 27	KSC	Discovery	19,988**	91.6	444	444	28.5	Crew: Joe Engle, Richard Covey, James Van Hoften, William Fisher, Michael Lounge. Launched 3 satellites, repaired Leasat 3, returned 9/3 after 7 days, 2 hrs, 17 mns.
Aussat 1	1985 076B	Aust	Aug 27	STS	PAM-D	655†	1,436.2	35,779	35,795	0.0	Domestic communications, stationed above 158 deg. w long.
ASC 1	1985 076C	US	Aug 27	STS	PAM-D	1,271	1,436.1	35,782	35,791	0.1	Commerical communications, positioned above 81 deg. e long.

*Remote Manipulator System
**Payload Weight
†When Fuel is depleted

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Syncom IV-4 (Leasat 4)	1985 076D	US	Aug 29	STS	PKM*	1,388**	1,436.1	35,079	36,493	1.4	Military communications, stationed above 178 deg. e long. UHF contact lost 9/6
Unannounced	–	US	Aug 28	WMSC	Titan III						Launch failure
Kosmos 1678	1985 077A	USSR	Aug 29	Plesetsk	A-2	6,300	89.8	258	272	82.3	Earth resources photo recon, recovered 9/12
Kosmos 1679	1985 078A	USSR	Aug 29	Tyuratam	A-2	6,300	89.6	172	342	64.8	Military photo recon, recovered 10/18
Kosmos 1680	1985 079A	USSR	Sep 4	Plesetsk	C-1	700	100.7	782	804	74.1	Military communications; replaced Kosmos 1538
Kosmos 1681	1985 080A	USSR	Sep 6	Plesetsk	A-2	6,300	89.0	219	226	82.3	Earth resources photo recon, recovered 9/19
Spacenet 3	–	US	Sep 13	Kourou	Ariane V15						Launch failure
ECS 3	–	ESA	Sep 13	Kourou	Ariane V15						Launch failure
Soyuz T-14	1985 081A	USSR	Sep 17	Tyuratam	A-2	6,850	91.3	338	353	51.6	Crew: Vladimir Vasyutin, Georgi Grechko, Aleksandr Volkov; docked w/ Salyut 7, 9/18. Medical emergency required cosmonauts to return, 11/22
Kosmos 1682	1985 082A	USSR	Sep 19	Tyuratam	F-1-m	–	92.4	341	446	65.0	Elint. Exploded 12/18, 23 pieces
Kosmos 1683	1985 083A	USSR	Sep 19	Plestesk	A-2	6,300	92.3	356	414	72.8	Military photo recon, recovered 10/4
Kosmos 1684	1985 084A	USSR	Sep 24	Plesetsk	A-2-e	1,250	717.8	1,133	39,221	62.7	Early warning; replaced Kosmos 1586
Kosmos 1685	1985 085A	USSR	Sep 27	Plesetsk	A-2	6,300	92.3	356	416	72.8	Military photo recon, recovered 10/10
Kosmos 1686	1985 086A	USSR	Sep 27	Tyuratam	D-1	20,000	94.0	470	471	51.6	Resupplied and enlarged Salyut 7; docked 10/2
Intelsat VA-12	1985 087A	ITSO	Sep 29	ESMC	Atlas Centaur	1,096	1,436.1	35,772	35,802	0.0	Telephone communications operating at C and L-band; stationed above 31 deg. e long.
Kosmos 1687	1985 088A	USSR	Sep 30	Plesetsk	A-2-e	1,250	718.1	2,081	38,262	63.1	Early warning; replaced Kosmos 1401
Kosmos 1688	1985 089A	USSR	Oct 2	Kapustin Yar	C-1	550	92.1	320	434	50.7	Minor military
Kosmos 1689	1985 090A	USSR	Oct 3	Tyuratam	A-1	1,500	96.9	568	655	98.0	Earth resources remote sensing
Molniya 3-26	1985 091A	USSR	Oct 3	Plesetsk	A-2-e	1,800	717.6	821	39,528	64.3	Domestic communications

*Perigee Kick Motor

**When Fuel is depleted

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
STS 51-J	1985 092A	US	Oct 3	KSC	Atlantis	–	93.8	515	515	28.5	Crew: Karol Bobko, Ronald Grabe, David Hilmers, Robert Stewart, William Pailes; DoD mission, launched 2 satellites, landed 10/7 after 4 days, 1 hr., 46 mns.
Unannounced	1985 092B	US	Oct 3	STS	IUS	–	Elements not available				In orbit
Unannounced	1985 092C	US	Oct 3	STS	IUS	–	Elements not available				In orbit
Navstar 11	1985 093A	US	Oct 9	WSMC	Atlas E	163	717.9	19,887	20,474	63.4	Navigation
Kosmos 1690	1985 094A	USSR	Oct 9	Plesetsk	F-2	–	113.7	1,381	1,412	82.6	New satellite series, mission similar to Kosmos 1617-1622
Kosmos 1691	1985 094B	USSR	Oct 9	Plesetsk	F-2	–	114.0	1,409	1,413	82.6	Exploded 11/22, 18 pieces
Kosmos 1692	1985 094C	USSR	Oct 9	Plesetsk	F-2	–	113.8	1,387	1,413	82.6	
Kosmos 1693	1985 094D	USSR	Oct 9	Plesetsk	F-2	–	113.8	1,391	1,413	82.6	
Kosmos 1694	1985 094E	USSR	Oct 9	Plesetsk	F-2	–	113.9	1,396	1,413	82.6	
Kosmos 1695	1985 094F	USSR	Oct 9	Plesetsk	F-2	–	114.0	1,402	1,414	82.6	
Kosmos 1696	1985 095A	USSR	Oct 16	Tyuratam	A-2	–	89.6	230	281	70.3	Military photo recon; recovered 10/30
PRC 17	1985 096A	PRC	Oct 21	Shuang Cheng Tzu	CZ-2	2,500	90.19	173	395	62.9	Surveyed land resources; recovered 10/26
Kosmos 1697	1984 097A	USSR	Oct 22	Tyuratam	SL-16*	–	101.9	846	853	71.0	Elint
Kosmos 1698	1985 098A	USSR	Oct 22	Plesetsk	A-2-e	1,250	716.8	1,534	38,769	63.1	Early warning; replaced Kosmos 1541
Molniya 1-65	1985 099A	USSR	Oct 23	Tyuratam	A-2-e	1,800	717.8	818	39,532	64.5	Communications; replaced Molniya 1-58
Meteor 3-1	1985 100A	USSR	Oct 24	Plesetsk	F-2	–	109.4	1,185	1,210	82.5	Meteorological; new generation weather satellite
Kosmos 1699	1985 101A	USSR	Oct 25	Plesetsk	A-2	6,700	89.5	167	339	67.1	Military photo recon; recovered 12/23
Kosmos 1700	1985 102A	USSR	Oct 25	Tyuratam	D-1-e	4,000	1,435.6	35,758	35,796	0.6	Communications, data relay(?), stationed above 95 deg. e long.
Molniya 1-66	1985 103A	USSR	Oct 28	Plesetsk	A-2-e	1,800	717.8	1,089	39,265	62.9	Communications; replaced Molniya 1-56
STS 61-A	1985 104A	US	Oct 30	KSC	Challenger	14,443**	91.0	331	331	57.0	Crew: Henry Hartsfield, Jr., Steven Nagel, Bonnie Dunbar, Guion Bluford, Jr., Ernst Messerschmid, Reinhard Furrer, Wubbo Ockels, James Buchli. Carried Spacelab D-1; launched 1 satellite, landed, 11/6 after 7 days, 45 mns.

*DoD designation
**Payload weight

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Glomr	1985 104B	US	Nov 1	STS	–	52	90.9	304	332	57.0	Relayed ground signals. Decayed 12/26/86
Kosmos 1701	1985 105A	USSR	Nov 9	Plesetsk	A-2-e	1,250	717.5	1,265	39,074	65.6	Early warning; replaced Kosmos 1675
Kosmos 1702	1985 106A	USSR	Nov 13	Plesetsk	A-2	6,300	92.2	356	414	72.8	Military photo recon, recovered 11/27
Raduga 17	1985 107A	USSR	Nov 15	Tyuratam	D-1-e	2,000	1,436.2	35,788	35,790	1.3	Communications, stationed above 35 deg. e long.
Kosmos 1703	1985 108A	USSR	Nov 22	Plesetsk	F-2	–	97.7	630	664	82.5	Elint; replaced Kosmos 1674
STS 61-B	1985 109A	US	Nov 27	KSC	Atlantis	21,762*	91.9	377	377	28.5	Crew: Brewster Shaw, Jr., Bryan O'Connor, Rodolfo Neri Vela, Charles Walker, Mary Cleave, Jerry Ross, Sherwood Spring. Deployed 3 satellites, 1 experiment, returned, 12/3 after 6 days, 20 hrs., 54 mns.
Morelos 2	1985 109B	Mexico	Nov 27	STS	PAM-D	645	1,436.1	35,773	35,801	1.1	Domestic communications satellite; in parking orbit
Aussat 2	1985 109C	Aust	Nov 28	STS	PAM-D	1,259	1,436.2	35,786	35,790	0.0	Domestic communications; stationed above 156 deg. e long.
Satcom K2	1985 109D	US	Nov 28	STS	PAM-D	1,812	1,436.2	35,774	35,801	0.0	Communications; positioned above 81 deg. w long.
OEX	1985 109E	US	Nov 30	STS	EVA	16	92.1	371	382	28.5	Shuttle autopilot software test target. Decayed 3/12/87
Kosmos 1704	1985 110A	USSR	Nov 28	Plesetsk	C-1	810	104.8	961	1,007	82.9	Navigation; replaced Kosmos 1598
Kosmos 1705	1985 111A	USSR	Dec 3	Plesetsk	A-2	6,300	92.2	356	415	72.8	Military photo recon, recovered 12/17
Kosmos 1706	1985 112A	USSR	Dec 11	Plesetsk	A-2	6,700	89.4	171	321	72.9	Earth resources photo recon; recovered 2/9/86
Kosmos 1707	1985 113A	USSR	Dec 12	Plesetsk	F-2	–	97.7	630	662	82.5	Elint; replaced Kosmos 1515
ASAT Target 1	1985 114A	US	Dec 13	WI	Scout	–	95.6	314	776	37.1	In orbit
ASAT Target 2	1985 114B	US	Dec 13	WI	Scout	–	95.5	314	772	37.1	Decayed 8/9/87
Kosmos 1708	1985 115A	USSR	Dec 13	Plesetsk	A-2	6,300	89.8	257	273	82.2	Military photo recon, recovered 12/27
Kosmos 1709	1985 116A	USSR	Dec 19	Plesetsk	C-1	810	104.8	959	1,009	82.9	Navigation; replaced Kosmos 1610
Molniya 3-27	1985 117A	USSR	Dec 24	Plesetsk	A-2-e	1,800	735.7	1,521	38,834	62.9	Domestic communications
Kosmos 1710	1985 118A	USSR	Dec 24	Tyuratam	D-1-e	–	675.7	19,111	19,147	65.2	Glonass navigation system
Kosmos 1711	1985 118B	USSR	Dec 24	Tyuratam	D-1-e	–	675.7	19,104	19,154	65.2	Glonass navigation system
Kosmos 1712	1985 118C	USSR	Dec 24	Tyuratam	D-1-e	–	676.3	19,136	19,151	65.2	Glonass navigation system

*Payload weight

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Meteor 2-13	1985 119A	USSR	Dec 26	Plesetsk	F-2	–	104.0	936	958	82.5	Meteorological
Kosmos 1713	1985 120A	USSR	Dec 27	Plesetsk	A-2	–	90.6	214	395	62.8	Military photo recon; recovered 1/22/86
Kosmos 1714	1985 121A	USSR	Dec 28	Tyuratam	SL-16*		94.5	161	826	71.0	Elint; decayed 2/27/86
Kosmos 1715	1986 001A	USSR	Jan 8	Plesetsk	A-2	6,000	89.4	226	263	72.8	Photo recon. Recovered 1/22
Kosmos 1716	1986 002A	USSR	Jan 9	Plesetsk	C-1	40	115.5	1,462	1,490	74.0	Communications; 8-satellite launch
Kosmos 1717	1986 002B	USSR	Jan 9	Plesetsk	C-1	40	115.8	1,472	1,512	74.0	Communications, Failed 11/27
Kosmos 1718	1986 002C	USSR	Jan 9	Plesetsk	C-1	40	115.6	1,475	1,497	74.0	Communications
Kosmos 1719	1985 002D	USSR	Jan 9	Plesetsk	C-1	40	115.3	1,453	1,482	74.0	Communications
Kosmos 1720	1985 002E	USSR	Jan 9	Plesetsk	C-1	40	115.1	1,439	1,482	74.0	Communications
Kosmos 1721	1986 002F	USSR	Jan 9	Plesetsk	C-1	40	115.0	1,425	1,481	74.0	Communications
Kosmos 1722	1986 002G	USSR	Jan 9	Plesetsk	C-1	40	114.8	1,411	1,481	74.0	Communications
Kosmos 1723	1986 002H	USSR	Jan 9	Plesetsk	C-1	40	114.6	1,398	1,479	74.0	Communications, Failed 9/12
STS 61-C	1986 003A	US	Jan 12	KSC	Columbia	14,705**	91.3	339	339	28.5	Crew:Robert Gibson Charles Bolden, Steve Hawley, George Nelson, Robert Cenker, Franklin Chang-Diaz, Bill Nelson; Deployed 1 satellite. Returned 1/18 after 6 days, 2 hrs, 4 mns.
Satcom K-1	1986 003B	US	Jan 12	STS	Pam D2	1,923	1,436.2	35,781	35,794	0.0	Commercial communications. Positioned above 81 deg. w long.
Kosmos 1724	1986 004A	USSR	Jan 15	Plesetsk	A-2	6,000	89.2	168	334	67.1	Photo recon. Recovered 3/15
Kosmos 1725	1986 005A	USSR	Jan 17	Plesetsk	C-1	810	104.8	1,001	967	82.9	Navigation. Replaced Kosmos 1577
Kosmos 1726	1986 006A	USSR	Jan 17	Plesetsk	F-2	2,000	97.6	628	660	82.5	Elint. Replaced Kosmos 1606
Raduga 18	1986 007A	USSR	Jan 17	Tyuratam	D-1-e	2,000	1,436.2	35,781	35,797	0.5	Domestic communications. Stationed above 335 deg. e long.
Kosmos 1727	1986 008A	USSR	Jan 23	Plesetsk	C-1	810	104.8	958	1,013	82.9	Navigation. Replaced Kosmos 1506
Kosmos 1728	1986 009A	USSR	Jan 28	Tyuratam	A-2	6,000	89.4	223	270	70.0	Photo recon. Recovered 2/11

*DoD designation
**Payload weight

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
STS 51-L		US	Jan 28	KSC	Challenger	23,695*					Vehicle destroyed by explosion 73 seconds after launch. Astronauts Dick Scobee, Michael Smith, Ronald McNair, Ellison Onizuka, Greg Jarvis, Christa McAuliffe, Judith Resnik perished. Failure traced to O-ring seal
PRC 18	1986 010A	PRC	Feb 1	Xi Chang	CZ-3		1,435.9	35,779	35,790	0.2	Domestic communications. Stationed above 103 deg. e long.
Kosmos 1729	1986 011A	USSR	Feb 1	Plesetsk	A-2-e	1,250	718.0	938	39,389	62.8	Early warning; Replaced Kosmos 1569
Kosmos 1730	1986 012A	USSR	Feb 4	Plesetsk	A-2	6,000	89.6	224	280	72.9	Military photo recon. Recovered 2/13
Kosmos 1731	1986 013A	USSR	Feb 7	Tyuratam	A-2	2,500	89.9	183	269	64.8	Military photo recon. Reentered 10/3
None	1986 014A	US	Feb 9	WSMC	Atlas F		Elements not available				In orbit
Kosmos 1732	1986 015A	USSR	Feb 11	Plesetsk	F-2		116.0	1,477	1,524	73.6	Geodetic
BS-2B	1986 016A	Japan	Feb 12	Tanegashima	N-II	677	1,436.2	35,774	35,802	0.0	Domestic communications. Placed above 117 deg. e long.
Mir	1986 017A	USSR	Feb 19	Tyuratam	D-1	20,100	91.5	335	358	51.6	Soviet space station; occupied by Leonid Kizim, Vladimir Solovyov, 3/15-5/6 and 6/27-7/16
Kosmos 1733	1986 018A	USSR	Feb 19	Plesetsk	F-2		97.7	632	663	82.5	Elint. Replaced Kosmos 1544
SPOT 1	1986 019A	France	Feb 22	Kourou	Ariane 1	1,830	101.4	824	828	98.7	Remote sensing for earth resources, commercial use. Booster exploded in orbit, 400 pieces
Viking	1986 019B	Sweden	Feb 22	Kourou	Ariane 1	538	261.7	790	13,359	98.8	Studying magnetic, electric, ultraviolet properties of auroral regions
Kosmos 1734	1986 020A	USSR	Feb 26	Plesetsk	A-2	6,000	89.1	163	348	67.1	Military photo recon. Reentered 4/26
Kosmos 1735	1986 021A	USSR	Feb 27	Tyuratam	F-1-m		93.2	419	442	65.0	Ocean surveillance
Soyuz T-15	1986 022A	USSR	Mar 13	Tyuratam	A-2	7,000	91.2	352	339	51.6	Cosmonauts Leonid Kizim, Vladimir Solovyov aboard. Docked with Mir 3/15. Returned 7/16
Progress 25	1986 023A	USSR	Mar 19	Tyuratam	A-2	7,000	91.2	332	359	51.6	Resupplied Mir. Docked 3/21; undocked 4/20; reentered 4/21
Kosmos 1736	1986 024A	USSR	Mar 21	Tyuratam	F-1-m	5,000	104.4	940	993	65.0	Ocean surveillance; storage orbit
Kosmos 1737	1986 025A	USSR	Mar 25	Tyuratam	F-1-m		91.0	213	436	73.3	Ocean surveillance. Reentered 12/3
GSTAR 2	1986 026A	US	Mar 28	Kourou	Ariane 3	1,243	1,436.2	35,775	35,800	0.1	U.S. commercial communications. Stationed above 105 deg. w long.

*Payload weight

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Brasilsat 2	1986 026B	Brazil	Mar 28	Kourou	Ariane 3	1,140	1,436.2	35,781	35,796	0.0	Brazilian domestic communications. Located above 70 deg. w long.
Kosmos 1738	1986 027A	USSR	Apr 4	Tyuratam	D-1-e	2,000	1,436.2	35,740	35,834	0.8	Communications. Placed above 346 deg. e long.
Kosmos 1739	1986 028A	USSR	Apr 9	Tyuratam	A-2	6,000	89.5	173	329	64.8	Military photo recon. Reentered 6/7
Kosmos 1740	1986 029A	USSR	Apr 15	Plesetsk	A-2	6,000	92.2	352	413	72.9	Military photo recon. Recovered 4/28
Kosmos 1741	1986 030A	USSR	Apr 18	Plesetsk	C-1	700	100.7	779	808	74.0	Store/dump communications; replaced Kosmos 1503
Molniya 3-28	1986 031A	USSR	Apr 18	Plesetsk	A-2-e	1,800	717.7	512	39,841	64.2	Communications; replaced Molniya 3-23
None		US	Apr 18	WSMC	Titan 34D						Destroyed by launch vehicle explosion 16 seconds after launch
Progress 26	1986 032A	USSR	Apr 23	Tyuratam	A-2	7,000	91.3	336	344	51.6	Resupplied Mir; carried Salyut 7 cargo. Docked with Mir, 4/26. Undocked 6/22; reentered 6/23
GOES 7		US	May 3	ESMC	Delta						Destroyed by range safety after losing power seconds after launch
Kosmos 1742	1986 033A	USSR	May 14	Plesetsk	A-2	6,000	92.2	351	416	72.9	Military photo recon. Recovered 5/28
Kosmos 1743	1986 034A	USSR	May 15	Plesetsk	F-2	1,600	97.6	629	661	82.6	Elint. Replaced Kosmos 1626
Soyuz TM	1986 035A	USSR	May 21	Tyuratam	A-2	7,000	91.2	331	372	51.6	Test mission of new vehicle design. Docked with Mir, 5/23.Undocked, 5/29; returned, 5/30
Kosmos 1744	1986 036A	USSR	May 21	Plesetsk	A-2	6,000	90.4	218	371	62.8	Materials processing exps. Recovered 6/4
Kosmos 1745	1986 037A	USSR	May 23	Plesetsk	C-1	810	104.9	966	1,011	82.9	Navigation; replaced Kosmos 1627
Ekran 15	1986 038A	USSR	May 24	Tyuratam	D-1-e	2,000	1,436.3	35,788	35,794	0.4	Domestic communications; placed above 99 deg. e long.
Meteor 2-14	1986 039A	USSR	May 27	Plesetsk	F-2	2,000	104.1	941	960	82.5	Meteorological
Kosmos 1746	1986 040A	USSR	May 28	Plesetsk	A-2	6,000	89.8	255	269	82.3	Earth resources photo recon. Recovered 6/12
Kosmos 1747	1986 041A	USSR	May 29	Tyuratam	A-2	600	89.1	248	252	70.4	Military photo recon. Recovered 6/12
INTELSAT V-14		ESA	May 30	Kourou	Ariane 2						Destroyed by range safety when 3rd stage failed to ignite
Kosmos 1748	1986 042A	USSR	Jun 6	Plesetsk	C-1	40	115.1	1,452	1,467	74.0	Tactical communications; 8-satellite launch. Failed 9/1
Kosmos 1749	1986 042B	USSR	Jun 6	Plesetsk	C-1	40	114.4	1,392	1,467	74.0	Tactical communications
Kosmos 1750	1986 042C	USSR	Jun 6	Plesetsk	C-1	40	114.6	1,406	1,468	74.0	Tactical communications

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Kosmos 1751	1986 042D	USSR	Jun 6	Plesetsk	C-1	40	115.6	1,465	1,503	74.0	Tactical communications. Failed 9/1
Kosmos 1752	1986 042E	USSR	Jun 6	Plesetsk	C-1	40	115.4	1,466	1,485	74.0	Tactical communications
Kosmos 1753	1986 042F	USSR	Jun 6	Plesetsk	C-1	40	115.3	1,460	1,475	74.0	Tactical communications
Kosmos 1754	1986 042G	USSR	Jun 6	Plesetsk	C-1	40	114.9	1,436	1,468	74.0	Tactical communications
Kosmos 1755	1986 042H	USSR	Jun 6	Plesetsk	C-1	40	114.8	1,423	1,467	74.0	Tactical communications. Failed 8/1
Kosmos 1756	1985 043A	USSR	Jun 6	Tyuratam	A-2	6,000	89.4	169	323	64.9	Military photo recon. Reentered 8/4
Gorizont 12	1986 044A	USSR	Jun 10	Tyuratam	D-1-e	2,000	1,436.1	35,759	35,814	0.8	Domestic communications; stationed above 345 deg. e long.
Kosmos 1757	1986 045A	USSR	Jun 11	Plesetsk	A-2	6,000	90.0	165	384	82.3	Earth resources photo recon. Recovered 6/25
Kosmos 1758	1986 046A	USSR	Jun 12	Plesetsk	F-2	1,600	97.7	628	666	82.5	Elint. Replaced Kosmos 1666
Kosmos 1759	1986 047A	USSR	Jun 18	Plesetsk	C-1	810	104.8	967	1,000	82.9	Navigation; replaced Kosmos 1634
Kosmos 1760	1986 048A	USSR	Jun 19	Tyuratam	A-2	6,000	92.2	350	415	70.0	Military photo recon. Recovered 7/3
Molniya 3-29	1986 049A	USSR	Jun 19	Plesetsk	A-2-e	1,800	717.7	600	39,750	63.9	Communications; replaced Molniya 3-20
Kosmos 1761	1986 050A	USSR	Jul 5	Plesetsk	A-2-e	1,800	717.2	1,393	38,934	62.8	Early warning; maneuvered. Replaced Kosmos 1698
Kosmos 1762	1986 051A	USSR	Jul 10	Plesetsk	A-2	6,300	89.8	255	269	82.5	Earth resources photo recon. Recovered 7/24
Kosmos 1763	1986 052A	USSR	Jul 16	Plesetsk	C-1	700	100.4	754	803	74.0	Store/dump communications; replaced Kosmos 1741
Kosmos 1764	1986 053A	USSR	Jul 17	Tyuratam	A-2	7,000	89.5	170	327	64.9	Photo recon. Reentered 9/11
Kosmos 1765	1986 054A	USSR	Jul 24	Plesetsk	A-2	6,300	92.2	353	412	72.9	Photo recon. Recovered 8/7
Kosmos 1766	1986 055A	USSR	Jul 28	Plesetsk	F-2	1,600	97.7	631	662	82.5	Oceanographic
Kosmos 1767	1986 056A	USSR	Jul 30	Tyuratam	SL-16	15,000	88.3	184	193	64.9	Unknown payload, died 8/1. Decayed 8/16
Molniya 1-67	1986 057A	USSR	Jul 30	Plesetsk	A-2-e	1,800	717.7	375	39,968	63.0	Communications; replaced Molniya 1-59
Kosmos 1768	1986 058A	USSR	Aug 2	Plesetsk	A-2	6,000	89.8	255	269	82.6	Earth resources photo recon. Recovered 8/16
Kosmos 1769	1986 059A	USSR	Aug 4	Tyuratam	F-1-m	5,000	93.3	429	443	65.0	Ocean surveillance. Exploded 9/21. Decayed 2/18/88
Kosmos 1770	1986 060A	USSR	Aug 6	Tyuratam	A-2	7,000	89.7	238	281	64.7	Photo recon. Reentered 2/2/87
EGP	1986 061A	Japan	Aug 12	Tanegashima	H-1	685	115.7	1,479	1,497	50.0	Experimental Geophysical Payload. Test of new launch vehicle
JAS-1	1986 061B	Japan	Aug 12	Tanegashima	H-1	50	116.9	1,480	1,497	50.0	Japanese Amateur Satellite (radio relay)

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1771	1986 062A	USSR	Aug 20	Tyuratam	F-1-m	5,000	104.2	910	1,001	65.0	Ocean surveillance; storage orbit
Kosmos 1772	1986 063A	USSR	Aug 21	Plesetsk	A-2	6,300	89.4	356	415	72.9	Photo recon. Recovered 9/3
Kosmos 1773	1986 064A	USSR	Aug 27	Tyuratam	A-2	7,000	89.7	173	343	64.9	Photo recon. Reentered 10/21
Kosmos 1774	1986 065A	USSR	Aug 28	Plesetsk	A-2-e	1,800	717.5	925	39,428	64.3	Early warning; replaced Kosmos 1547
Kosmos 1775	1986 066A	USSR	Sep 3	Tyuratam	A-2	6,300	92.1	348	414	70.4	Photo recon. Recovered 9/17
Kosmos 1776	1986 067A	USSR	Sep 3	Plesetsk	C-1	700	94.5	471	513	74.0	Minor military
Molniya 1-68	1986 068A	USSR	Sep 5	Plesetsk	A-2-e	1,800	717.7	602	39,747	63.1	Communications; replaced Molniya 1-57
None	1986 069A	US	Sep 5	ESMC	Delta		93.9	212	719	39.1	Decayed 9/28
None	1986 069B	US	Sep 5	ESMC	Delta		92.9	223	611	22.8	Decayed 11/25
Kosmos 1777	1986 070A	USSR	Sep 10	Plesetsk	C-1	700	100.7	774	809	74.0	Communications; replaced Kosmos 1624
Kosmos 1778	1986 071A	USSR	Sep 16	Tyuratam	D-1-e		675.7	19,131	19,139	64.8	Navigation; Glonass system
Kosmos 1779	1986 071B	USSR	Sep 16	Tyuratam	D-1-e		675.7	19,123	19,138	64.8	Navigation; Glonass system
Kosmos 1780	1986 071C	USSR	Sep 16	Tyuratam	D-1-e		675.7	19,105	19,153	64.8	Navigation; Glonass system
Kosmos 1781	1986 072A	USSR	Sep 17	Tyuratam	A-2	6,000	92.2	345	416	70.4	Photo recon. Recovered 10/1
NOAA 10	1986 073A	US	Sep 17	WSMC	Atlas E	1,700	101.2	808	826	98.7	Meteorological
Kosmos 1782	1986 074A	USSR	Sep 30	Plesetsk	F-2	1,400	97.7	636	664	82.5	Elint
Kosmos 1783	1986 075A	USSR	Oct 3	Plesetsk	A-2-e	1,800	358.1	639	20,009	62.8	Launch vehicle malfunction, failed to achieve operable orbit
PRC 19	1986 076A	PRC	Oct 6	Shuang Cheng Tzu	CZ-2	2,500	90.0	172	375	56.9	Earth resources, film capsule recovered 10/11
Kosmos 1784	1986 077A	USSR	Oct 6	Tyuratam	A-2	7,000	89.2	207	265	64.8	Photo recon. Reentered 11/11
Kosmos 1785	1986 078A	USSR	Oct 15	Plesetsk	A-2-e	1,800	717.6	1,011	39,325	64.4	Early warning; replaced Kosmos 1596
Molniya 3-30	1986 079A	USSR	Oct 20	Plesetsk	A-2-e	1,800	717.8	402	39,944	62.8	Communications; replaced Molniya 3-21
Kosmos 1786	1986 080A	USSR	Oct 22	Tyuratam	SL-16	15,000	96.7	149	1,054	64.8	Decayed 3/6/88. Unknown payload
Kosmos 1787	1986 081A	USSR	Oct 22	Tyuratam	A-2	6,300	89.6	230	281	70.0	Photo recon. Recovered 11/4

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Raduga 19	1986 082A	USSR	Oct 25	Tyuratam	D-1-e	2,000	1,436.5	36,765	36,822	1.1	Communications. Placed above 45 deg. e long.
Kosmos 1788	1986 083A	USSR	Oct 27	Plesetsk	C-1	700	94.4	460	514	65.8	Minor military
Kosmos 1789	1986 084A	USSR	Oct 31	Plesetsk	A-2	6,300	91.1	318	338	82.6	Earth resources photo recon. Recovered 11/14
Kosmos 1790	1986 085A	USSR	Nov 4	Plesetsk	A-2	6,300	89 5	224	279	72.9	Photo recon. Recovered 11/18
Kosmos 1791	1986 086A	USSR	Nov 13	Plesetsk	C-1	810	104.7	951	1,010	82.9	Navigation; replaced Kosmos 1553
Kosmos 1792	1986 087A	USSR	Nov 13	Tyuratam	A-2	7,000	89.3	167	312	64.9	Photo recon. Reentered 1/5/87
Polar Bear	1986 088A	US	Nov 14	WSMC	Scout	125	104.9	960	1,015	89.6	Polar Beacon Experiments and Research satellite
Molniya 1-69	1986 089A	USSR	Nov 15	Plesetsk	A-2-e	1,800	717.8	957	39,397	63.0	Communications; replaced Molniya 1-60
Gorizont 13	1986 090A	USSR	Nov 18	Tyuratam	D-1-e	2,000	1,436.2	35,777	35,801	0.4	Communications; located above 90 deg. e long.
Kosmos 1793	1986 091A	USSR	Nov 20	Plesetsk	A-2-e	1,800	717.7	1,316	39,035	62.8	Early warning; replaced Kosmos 1687
Kosmos 1794	1986 092A	USSR	Nov 21	Plesetsk	C-1	40	115.6	1,467	1,501	74.0	Tactical communications. 8 satellite launch
Kosmos 1795	1986 092B	USSR	Nov 21	Plesetsk	C-1	40	115.4	1,467	1,482	74.0	Tactical communications
Kosmos 1796	1986 092C	USSR	Nov 21	Plesetsk	C-1	40	115.2	1,455	1,479	74.0	Tactical communications
Kosmos 1797	1986 092D	USSR	Nov 21	Plesetsk	C-1	40	115.0	1,445	1,472	74.0	Tactical communicaitons
Kosmos 1798	1986 092E	USSR	Nov 21	Plesetsk	C-1	40	114.9	1,429	1,473	74.0	Tactical communications
Kosmos 1799	1986 092F	USSR	Nov 21	Plesetsk	C-1	40	114.7	1,415	1,472	74.0	Tactical communications
Kosmos 1800	1986 092G	USSR	Nov 21	Plesetsk	C-1	40	114.5	1,399	1,473	74.0	Tactical communications
Kosmos 1801	1986 092H	USSR	Nov 21	Plesetsk	C-1	40	114.4	1,386	1,471	74.0	Tactical communications
Kosmos 1802	1986 093A	USSR	Nov 24	Plesetsk	C-1	810	104.9	963	1,025	82.9	Navigation; replaced Kosmos 1605
Kosmos 1803	1986 094A	USSR	Dec 2	Plesetsk	F-2	700	115.9	1,495	1,499	82.6	Geodetic
Kosmos 1804	1986 095A	USSR	Dec 4	Tyuratam	A-2	6,300	92.1	345	412	70.0	Photo recon. Recovered 12/18
FltSatCom 7	1986 096A	US	Dec 5	ESMC	Atlas Centaur	2,310	1,426.3	35,703	35,875	4.3	Military communications
Kosmos 1805	1986 097A	USSR	Dec 10	Plesetsk	F-2	1,400	97.7	635	661	82.5	Elint? May be new spacecraft
Kosmos 1806	1986 098A	USSR	Dec 12	Plesetsk	A-2-e	1,800	717.9	832	39,528	62.8	Early warning; replaced Kosmos 1729
Kosmos 1807	1986 099A	USSR	Dec 16	Plesetsk	A-2	6,700	89.5	164	336	67.1	Photo recon. Reentered 2/23/87

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1808	1986 100A	USSR	Dec 17	Plesetsk	C-1	810	105.0	973	1,020	82.9	Navigation; replaced Kosmos 1704/1598
Kosmos 1809	1986 101A	USSR	Dec 18	Plesetsk	F-2	700	104.1	944	964	82.5	Science mission
Kosmos 1810	1986 102A	USSR	Dec 26	Tyuratam	A-2	7,000	89.6	245	263	64.8	Photo recon. Decayed 9/11/87
Molniya 1-70	1986 103A	USSR	Dec 26	Plesetsk	A-2-e	1,800	717.8	1,043	39,310	62.9	Communications; replaced Molniya 1-62
Meteor 2-15	1987 001A	USSR	Jan 5	Plesetsk	F-2	2,000	104.0	939	957	82.5	Meteorological
Kosmos 1811	1987 002A	USSR	Jan 9	Tyuratam	A-2	7,000	89.4	200	286	64.6	Photo recon. Reentered 2/13
Kosmos 1812	1987 003A	USSR	Jan 14	Plesetsk	F-2	1,600	97.7	634	664	82.5	Ocean surveillance
Kosmos 1813	1987 004A	USSR	Jan 15	Plesetsk	A-2	6,300	92.2	353	413	72.8	Military photo recon. Reentry module destroyed by explosion 1/29. 200 trackable fragments
Progress 27	1987 005A	USSR	Jan 16	Tyuratam	A-2	7,000	91.1	315	344	51.6	Supplied Mir. Raised station's orbit; prepared for Soyuz TM-2 arrival. Docked 1/18; undocked 2/23; reentered 2/25
Kosmos 1814	1987 006A	USSR	Jan 21	Plesetsk	C-1	700	100.7	771	810	74.1	Store/dump communications
Kosmos 1815	1987 007A	USSR	Jan 22	Kapustin Yar	C-1	700	93.5	345	550	50.7	Minor military
Molniya 3-31	1987 008A	USSr	Jan 22	Plesetsk	A-2-e	1,800	735.9	457	39,897	62.8	Domestic communications; on station 2/19
Kosmos 1816	1987 009A	USSR	Jan 29	Plesetsk	C-1	810	104.8	961	1,008	82.9	Navigation
Kosmos 1817	1987 010A	USSR	Jan 30	Tyuratam	D-1-e	2,000	87.4	188	210	51.6	Communications. Booster malfunction. Payload decayed 1/31
Kosmos 1818	1987 011A	USSR	Feb 1	Plesetsk	F-1-m		110.7	786	800	65.0	Ocean surveillance
Astro C	1987 012A	Japan	Feb 5	Kagoshima	Mu-3S	420	97.0	517	708	31.1	Science. Studying X-rays, gamma rays
Soyuz TM-2	1987 013A	USSR	Feb 5	Tyuratam	A-2	7,000	91.6	517	708	51.6	Transported Yuri Romanenko, Aleksander Laveykin to Mir. Docked 2/7. Undocked 7/29. Returned with Laveykin, Alexander Viktorenko, Mohammid Faris (TM-3 crew), 7/30
Kosmos 1819	1987 014A	USSR	Feb 7	Plesetsk	A-2	6,700	89.1	209	256	72.8	Military photo recon. Recovered 2/18
Unannounced	1987 015A	US	Feb 11	WSMC	Titan IIIB		Elements not available				In orbit
Kosmos 1820	1987 016A	USSR	Feb 14	Tyuratam	SL-16	15,000	88.7	174	240	64.8	Launch vehicle test. Decayed 3/6
Kosmos 1821	1987 017A	USSR	Feb 18	Plesetsk	C-1	810	104.9	963	1,017	82.9	Navigation

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MOS-1	1987 018A	Japan	Feb 18	Tanegashima	N-II	745	103.2	909	909	99.1	Remote ocean sensing
Kosmos 1822	1987 019A	USSR	Feb 19	Plesetsk	A-2	12,000	73.0	225	287	89.5	Photo recon. Recovered 3/5
Kosmos 1823	1987 020A	USSR	Feb 20	Plesetsk	F-2	700	73.6	1,497	1,538	116.0	Geodetic. Broke up 12/17
Kosmos 1824	1987 021A	USSR	Feb 26	Plesetsk	A-2	700	89.5	163	337	67.1	Photo recon. Reentered 4/22
GOES 7	1987 022A	US	Feb 26	ESMC	Delta	399	1,436.3	35,783	37,796	0.1	Meteorological. Located above 83 deg. w long.
Progress 28	1987 023A	USSR	Mar 3	Tyuratam	A-2	7,000	89.2	198	274	51.6	Resupplied Mir. Docked 3/5; undocked 3/26; reentered 3/28
Kosmos 1825	1987 024A	USSR	Mar 3	Plesetsk	F-2	1,600	97.7	633	664	82.5	Ocean surveillance
Kosmos 1826	1987 025A	USSR	Mar 11	Plesetsk	A-2	6,300	92.3	355	415	72.9	Photo recon. Recovered 3/24
Kosmos 1827	1987 026A	USSR	Mar 13	Plesetsk	F-2		113.8	1,393	1,409	82.6	Six satellite launch. In orbit
Kosmos 1828	1987 026B	USSR	Mar 13	Plesetsk	F-2		113.7	1,382	1,409	82.6	In orbit
Kosmos 1829	1987 026C	USSR	Mar 13	Plesetsk	F-2		114.0	1,408	1,412	82.6	In orbit
Kosmos 1830	1987 026D	USSR	Mar 13	Plesetsk	F-2		113.9	1,405	1,409	82.6	In orbit
Kosmos 1831	1987 026E	USSR	Mar 13	Plesetsk	F-2		113.8	1,388	1,409	82.6	In orbit
Kosmos 1832	1987 026F	USSR	Mar 13	Plesetsk	F-2		113.9	1,398	1,409	82.6	In orbit
Kosmos 1833	1987 027A	USSR	Mar 18	Tyuratam	SL-16	1,600	101.9	848	853	71.0	Elint
Raduga 20	1987 028A	USSR	Mar 19	Tyuratam	D-1-e	2,000	1,436.1	35,766	35,827	0.8	Domestic communications. Located above 85 deg. e long.
Palapa B2P	1987 029A	Indnsa	Mar 20	ESMC	Delta	652	1,436.2	35,788	35,788	0.0	Communications. Located above 113 deg. w long.
Rohini		India	Mar 24	Sriharikota	SLV	150					Failed due to 2nd stage malfunction
FltSatCom 6		US	Mar 26	ESMC	Atlas-Centaur	2,300					Destroyed by range safety when it veered out of control
KVANT 1	1987 030A	USSR	Mar 31	Tyuratam	D-1	20,000	91.5	336	357	51.6	High energy observatory. Attempted 4/5 Mir docking failed, retried 4/9. Crew EVA cleared docking unit obstruction, 4/11.
Service Module	1987 030C	USSR	Mar 31	Tyuratam	D-1		92.2	366	390	51.6	Kvant service module undocked 4/12, boosted
Kosmos 1834	1987 031A	USSR	Apr 8	Tyuratam	F-1	5,000	92.8	402	415	65.0	Elint
Kosmos 1835	1987 032A	USSR	Apr 9	Tyuratam	A-2	7,000	89.3	165	314	64.8	Military photo recon. Recovered 6/4

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			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1836	1987 033A	USSR	Apr 16	Tyuratam	A-2	7,000	89.8	236	287	64.8	Military photo recon. Recovered 12/2
Progress 29	1987 034A	USSR	Apr 21	Tyuratam	A-2	7,000	90.3	221	361	51.6	Resupplied Mir. Docked 4/23; undocked and reentered 5/11
Kosmos 1837	1987 035A	USSR	Apr 22	Plesetsk	A-2	12,000	88.5	174	227	82.3	Photo recon. Recovered 4/28
Kosmos 1838	1987 036A	USSR	Apr 24	Tyuratam	D-1-e		303.1	201	16,934	64.9	Glonass series. Left in unusable orbit by upper stage failure
Kosmos 1839	1987 036B	USSR	Apr 24	Tyuratam	D-1-e		303.1	202	16,932	64.9	Glonass. Upper stage failure
Kosmos 1840	1987 036C	USSR	Apr 24	Tyuratam	D-1-e		303.2	213	17,124	64.9	Glonass. Upper stage failure
Kosmos 1841	1987 037A	USSR	Apr 24	Plesetsk	A-2	6,300	90.4	215	376	62.8	Materials processing. Recovered 5/8
Kosmos 1842	1987 038A	USSR	Apr 27	Plesetsk	F-2	1,600	97.7	631	663	82.5	Elint
Kosmos 1843	1987 039A	USSR	May 5	Tyuratam	A-2	6 ton	92.2	347	415	70.4	Recovered 5/19
Gorizont 14	1987 040A	USSR	May 11	Tyuratam	D-1	2,000	1,401.5	35,032	35,182	0.5	Domestic communications
Kosmos 1844	1987 041A	USSR	May 13	Tyuratam	SL-16		101.9	846	851	71.0	Elint
Kosmos 1845	1987 042A	USSR	May 13	Plesetsk	A-2	6,700	92.2	348	415	70.4	Photo recon. Recovered 5/27
Energiya	None	USSR	May 15	Tyuratam	SL-17	100,000	–	–	–	–	1st flight of Soviet superbooster
None	1987 043A	US	May 15	WSMC	Atlas		Elements not available				In orbit
Progress 30	1987 044A	USSR	May 19	Tyuratam	A-2	700	90.9	288	344	51.6	Resupplied Mir. Docked 5/21; undocked, reentered 7/19
Kosmos 1846	1987 045A	USSR	May 21	Plesetsk	A-2	6,300	91.9	319	339	82.3	Photo recon. Recovered 6/4
Kosmos 1847	1987 046A	USSR	May 26	Plesetsk	A-2	7,000	88.5	159	318	67.2	Photo recon. Reentered 7/22
Kosmos 1848	1987 047A	USSR	May 28	Plesetsk	A-2	6,300	92.2	354	411	72.9	Photo recon. Recovered 6/11
Kosmos 1849	1987 048A	USSR	Jun 4	Plesetsk	A-2-e	1,800	717.9	853	39,506	63.3	Early warning
Kosmos 1850	1987 049A	USSR	Jun 9	Plesetsk	C-1	700	100.7	781	804	74.0	Store/dump communications
Kosmos 1851	1987 050A	USSR	Jun 12	Plesetsk	A-2-e	1,800	717.2	599	39,729	62.9	Early warning
Kosmos 1852	1987 051A	USSR	Jun 16	Plesetsk	C-1	40	115.7	1,473	1,501	74.0	Eight satellite launch. Tactical communications
Kosmos 1853	1987 051B	USSR	Jun 16	Plesetsk	C-1	40	115.5	1,472	1,484	74.0	Tactical communications
Kosmos 1854	1987 051C	USSR	Jun 16	Plesetsk	C-1	40	115.3	1,459	1,482	74.0	Tactical communications
Kosmos 1855	1987 051D	USSR	Jun 16	Plesetsk	C-1	40	115.2	1,447	1,478	74.0	Tactical communications

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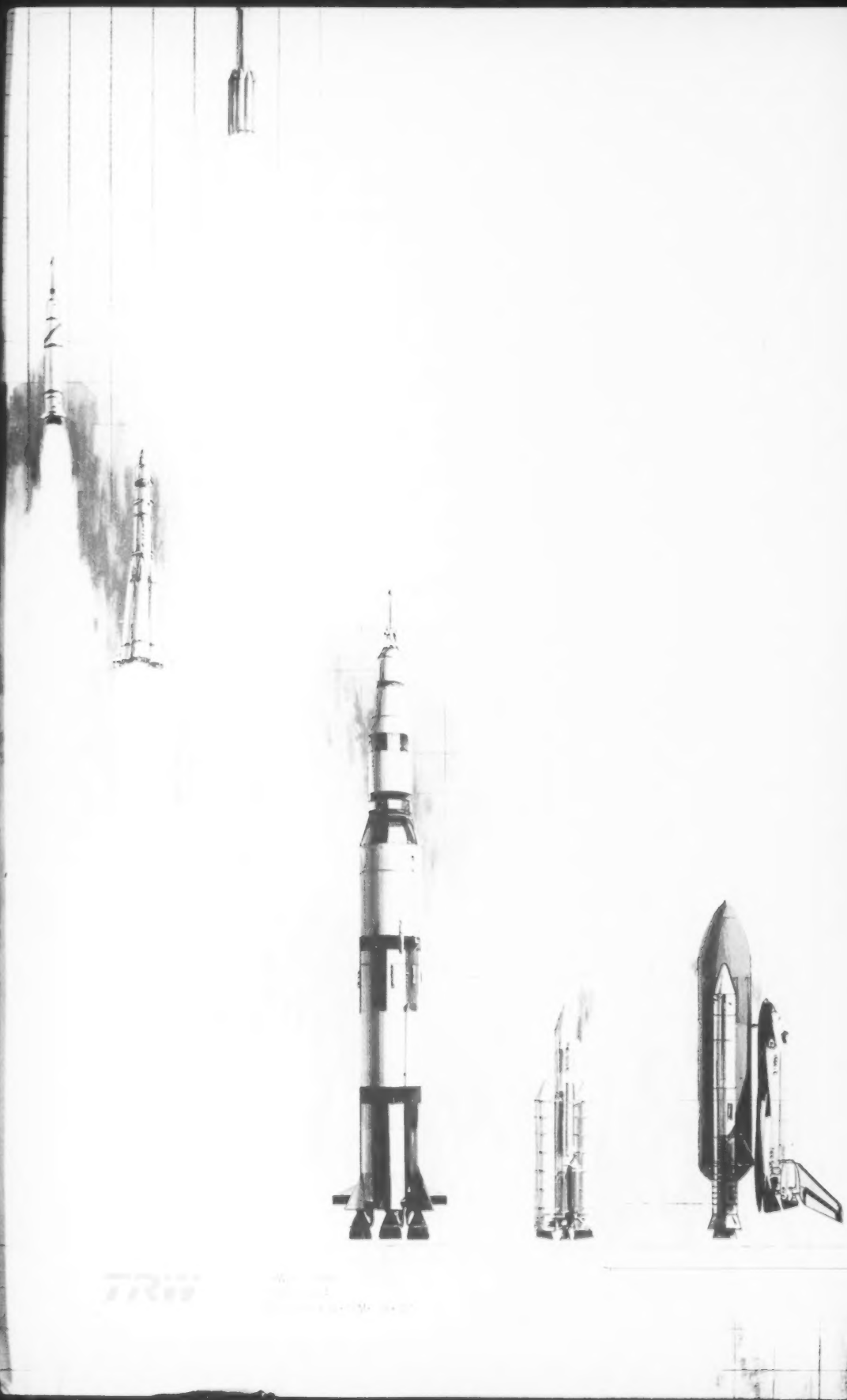
Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1856	1987 051E	USSR	Jun 16	Plesetsk	C-1	40	115.0	1,432	1,477	74.0	Tactical communications
Kosmos 1857	1987 051F	USSR	Jun 16	Plesetsk	C-1	40	114.8	1,418	1,478	74.0	Tactical communications
Kosmos 1858	1987 051G	USSR	Jun 16	Plesetsk	C-1	40	114.7	1,403	1,478	74.0	Tactical communications
Kosmos 1859	1987 051H	USSR	Jun 16	Plesetsk	C-1	40	114.5	1,388	1,477	74.0	Tactical communications
Kosmos 1860	1987 052A	USSR	Jun 18	Tyuratam	F-1	5,000	104.0	902	992	65.0	Ocean recon. Split up 7/20, nuclear power source boosted to high orbit
DMSP	1987 053A	US	Jun 20	WSMC	Atlas E	750	Elements not available				Weather imaging
Kosmos 1861	1987 054A	USSR	Jun 23	Plesetsk	C-1	810	104.9	982	997	82.9	Navigation
Kosmos 1862	1987 055A	USSR	Jul 1	Plesetsk	F-2	1,600	97.7	627	665	82.5	Elint
Kosmos 1863	1987 056A	USSR	Jul 4	Plesetsk	A-2	6,300	92.3	357	416	72.9	Photo recon. Recovered 7/18
Kosmos 1864	1987 057A	USSR	Jul 6	Plesetsk	C-1	810	104.8	961	1,006	82.9	Navigation
Kosmos 1865	1987 058A	USSR	Jul 8	Tyuratam	A-2	7,000	89.6	205	307	64.8	Photo recon. Recovered 8/14
Kosmos 1866	1987 059A	USSR	Jul 9	Plesetsk	A-2	7,000	89.7	175	345	67.2	Photo recon. Engine failed to shut down, propellent depleted prematurely. Exploded 7/26. Decayed 11/6
Kosmos 1867	1987 060A	USSR	Jul 10	Tyuratam	F-1	5,000	100.8	791	798	65.0	Ocean recon.
Kosmos 1868	1987 061A	USSR	Jul 14	Plesetsk	C-1	700	94.5	279	669	74.0	Minor military
Kosmos 1869	1987 062A	USSR	Jul 16	Plesetsk	F-2	1,600	97.7	631	663	82.5	Ocean sensing
Soyuz TM-3	1987 063A	USSR	Jul 22	Tyuratam	A-2	7,000	89.8	231	297	51.6	Transported Alexander Viktorenko, Alexander Alexandrov, Mohammed Faris to Mir. Docked 7/24. Returned with Yuri Romanenko (TM-2), Alexander Alexandrov, Anatolyi Levchenko (TM-4), 12/29
Kosmos 1870	1987 064A	USSR	Jul 22	Tyuratam	D-1	20,000	89.5	245	259	71.9	Remote sensing. Possible modified Salyut
Kosmos 1871	1987 065A	USSR	Aug 1	Tyuratam	SL-16	15,000	88.1	168	188	97.0	Unknown payload; decayed 8/10
Progress 31	1987 066A	USSR	Aug 3	Tyuratam	A-2	7,000	88.9	187	250	51.6	Resupplied Mir. Docked 8/5; Undocked 9/21; Reentered 9/23
PRC 20	1987 067A	PRC	Aug 5	Shuang Cheng Tzu	CZ-2	2,500	90.2	171	395	63.0	Micro-gravity experiments. Capsule recovered 8/10, spacecraft reentered 8/23



Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Meteor 2-16	1987 068A	USSR	Aug 18	Plesetsk	F-2	200	104.0	940	957	82.6	Meteorological
Kosmos 1872	1987 069A	USSR	Aug 19	Plesetsk	A-2	6,700	90.8	247	385	72.9	Photo recon. Recovered 8/30
ETS-5	1987 070A	Japan	Aug 27	Tanegashima	H-1	550	1,436.1	35,763	35,811	0.0	Communications. Located above 150 deg. e long.
Kosmos 1873	1987 071A	USSR	Aug 28	Tyuratam	SL-16	15,000	88.7	175	241	64.8	Unknown payload. Decayed 9/14
Kosmos 1874	1987 072A	USSR	Sep 3	Plesetsk	A-2	6,700	89.6	223	284	72.9	Photo recon. Recovered 9/17
Ekran 16	1987 073A	USSR	Sep 4	Tyuratam	D-1-e	2,000	1,436.0	35,765	35,804	0.1	Domestic communications. Located above 99 deg. e long.
Kosmos 1875	1987 074A	USSR	Sep 7	Plesetsk	F-2	40	113.7	1,407	1,383	82.6	Six satellite launch. In orbit
Kosmos 1876	1987 074B	USSR	Sep 7	Plesetsk	F-2	40	114.0	1,412	1,407	82.6	In orbit
Kosmos 1877	1987 074C	USSR	Sep 7	Plesetsk	F-2	40	113.9	1,408	1,406	82.6	In orbit
Kosmos 1878	1987 074D	USSR	Sep 7	Plesetsk	F-2	40	113.9	1,408	1,399	82.6	In orbit
Kosmos 1879	1987 074E	USSR	Sep 7	Plesetsk	F-2	40	113.8	1,408	1,394	82.6	In orbit
Kosmos 1880	1987 074F	USSR	Sep 7	Plesetsk	F-2	40	113.8	1,408	1,390	82.6	In orbit
PRC 21	1987 075A	PRC	Sep 9	Shuang Cheng Tzu	CZ-2	2,500	89.6	308	204	63.0	Remote sensing. Return capsule recovered 9/17; vehicle reentered 10/4
Kosmos 1881	1987 076A	USSR	Sep 11	Tyuratam	A-2	7,000	89.5	227	270	64.8	Photo recon. Reentered 5/30/88
Kosmos 1882	1987 077A	USSR	Sep 15	Plesetsk	A-2	6,700	88.5	179	222	82.3	Photo recon, earth resources. Recovered 10/6
Aussat K3	1987 078A	Aust	Sep 16	Kourou	Ariane 3	1,195	1,436.1	35,781	35,793	0.0	Australian domestic communications. Located above 164 deg. e long.
ECS 4	1987 078B	ESA	Sep 16	Kourou	Ariane 3	1,175	1,436.1	35,777	35,797	0.1	European communications. Located above 10 deg. e long.
Kosmos 1883	1987 079A	USSR	Sep 16	Tyuratam	D-1-e		675.5	19,109	19,138	64.8	Glonass system. Navigation
Kosmos 1884	1987 079B	USSR	Sep 16	Tyuratam	D-1-e		675.5	19,113	19,136	65.0	Glonass system. Navigation
Kosmos 1885	1987 079C	USSR	Sep 16	Tyuratam	D-1-e		675.4	19,112	19,134	64.9	Glonass system. Navigation
Oscar 31	1987 080A	US	Sep 16	WSMC	Scout	59	107.3	1,018	1,183	90.3	In orbit
Oscar 32	1987 080B	US	Sep 16	WSMC	Scout	59	107.3	1,017	1,185	90.3	In orbit

Summary Log of Space Launches 1957-87

Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1886	1987 081A	USSR	Sep 17	Plesetsk	A-2	6,700	89.4	160	327	67.1	Photo recon. Recovered 11/2
Progress 32	1987 082A	USSR	Sep 23	Tyuratam	A-2	7,000	91.0	295	355	51.6	Resupplied Mir/Kvant. Docked 9/26; undocked 11/10 for control tests and redocked 1.5 hrs later. Undocked 11/17; Reentered 11/19
Kosmos 1887	1987 083A	USSR	Sep 29	Plesetsk	A-2	6,700	90.5	214	382	62.8	Biosat with 2 monkeys aboard. Recovered 10/12
Kosmos 1888	1987 084A	USSR	Oct 1	Tyuratam	D-1-e	2,000	1,436.2	35,759	35,817	1.2	Communications test. Located above 80 deg. e long.
Kosmos 1889	1987 085A	USSR	Oct 9	Tyuratam	A-2	6,700	92.1	346	412	70.0	Photo recon. Recovered 10/23
Kosmos 1890	1987 086A	USSR	Oct 10	Tyuratam	F-1-m	5,000	92.7	402	415	65.0	Ocean surveillance
Kosmos 1891	1987 087A	USSR	Oct 14	Plesetsk	C-1	810	104.9	953	1,025	82.9	Navigation
Kosmos 1892	1987 088A	USSR	Oct 20	Plesetsk	F-2	1,600	97.7	635	665	82.5	Elint
Kosmos 1893	1987 089A	USSR	Oct 22	Plesetsk	A-2	6,700	89.6	166	341	67.2	Photo recon. Recovered 12/16
None	1987 090A	US	Oct 26	WSMC	Titan 34D	elements not available					In orbit
Kosmos 1894	1987 091A	USSR	Oct 28	Tyuratam	D-1-e	2,000	1,436.1	35,779	35,793	1.3	Data relay. Stationed above 335 deg. e long.
Kosmos 1895	1987 092A	USSR	Nov 11	Tyuratam	A-2	6,300	89.6	224	283	70.4	Photo recon. Recovered 11/26
Kosmos 1896	1987 093A	USSR	Nov 14	Tyuratam	A-2	6,700	89.2	206	263	64.8	Photo recon. Recovered 12/25
Progress 33	1987 094A	USSR	Nov 20	Tyuratam	A-2	7,020	91.2	326	343	51.6	Resupplied Mir. Docked 11/23; undocked, reentered 12/19
TVSat 1	1987 095A	FRG	Nov 21	Kourou	Ariane 2	2,077	1,422.8	35,217	35,832	0.1	West German communications. Solar panel failed to deploy. Commercially unusable
Kosmos 1897	1987 096A	USSR	Nov 26	Tyuratam	D-1-e	2,000	1,435.1	35,715	35,818	1.4	Communications, data relay. Stationed above 95 deg. e long
None	1987 097A	US	Nov 29	ESMC	Titan 34D	Elements not available					In orbit
Kosmos 1898	1987 098A	USSR	Dec 1	Plesetsk	C-1	750	100.8	778	810	74.0	Communications
Kosmos 1899	1987 099A	USSR	Dec 7	Tyuratam	A-2	6,300	89.6	226	279	70.4	Photo recon. Recovered 12/21
Raduga 21	1987 100A	USSR	Dec 10	Tyuratam	D-1-e	2,000	1435.9	35,772	35,793	1.4	Domestic communications. Stationed above 128 deg. e long.
Kosmos 1900	1987 101A	USSR	Dec 12	Tyuratam	F-1-m	5,000	89.7	254	268	65.0	Rorsat
Kosmos 1901	1987 102A	USSR	Dec 14	Tyuratam	A-2	6,700	89.7	172	350	64.9	Photo recon. Recovered 2/3/88

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Name	Int'l Desig.	Proj. Dir.	Launch Data			Weight (kg)	Orbital Data				Status
			Date	Site	Vehicle		Period	Perigee	Apogee	Incl.	
Kosmos 1902	1987 103A	USSR	Dec 15	Plesetsk	C-1		92.3	368	411	65.8	Minor military
Soyuz TM-4	1987 104A	USSR	Dec 21	Tyuratam	A-2	7,070	91.5	333	358	51.6	Carried Vladimir Titov, Anatoly Levchenko, Musa Manarov to Mir. Docked 12/23. Undocked, redocked at forward port 12/30
Kosmos 1903	1987 105A	USSR	Dec 21	Plesetsk	A-2-e	1,250	717.6	588	39,755	63.0	Early warning
Kosmos 1904	1987 106A	USSR	Dec 23	Plesetsk	C-1	810	104.9	968	1,008	82.9	Navigation
Kosmos 1905	1987 107A	USSR	Dec 25	Tyuratam	A-2	6,300	89.6	229	280	70.4	Photo recon. Recovered 1/8/88
Kosmos 1906	1987 108A	USSR	Dec 26	Plesetsk	A-2	6,300	89.9	257	277	82.6	Photo recon, earth resources. Destroyed 1/31. Reentered 3/13/88
Ekran 17	1987 109A	USSR	Dec 27	Tyuratam	D-1-e	2,000	1432.0	35,459	35,953	1.6	Communications; stationed above 99 deg. e long.
Kosmos 1907	1987 110A	USSR	Dec 29	Plesetsk	A-2	6,300	92.3	356	415	72.8	Photo recon. Recovered 1/12/88